FEB 10 1960

ENGINEERING • CONSTRUCTION • OPERATIONS

PIPE LINE INDUSTRY

FEBRUARY
1960

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SPECIAL REPORT TO CATERPILLAR OWNERS:

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Parts you can trust
...cost less per hour

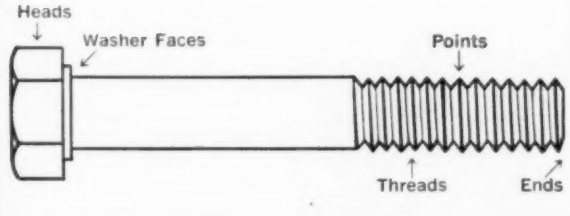
CAT ALL-PURPOSE BOLTS AND NUTS ARE STRONGER... HOLD LONGER... GRIP BETTER

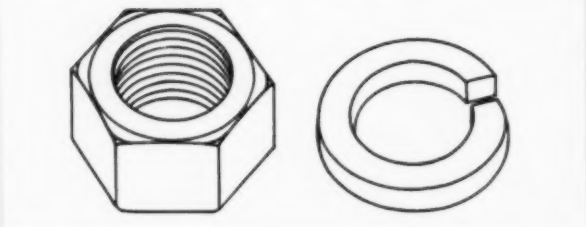
Ever twist a head off a bolt because it wasn't *strong* enough . . . or scrape your knuckle when your wrench "rounded off" the head because it wasn't *hard* enough? It's not likely to happen if you use Cat all-purpose bolts and nuts. They're highest quality in every way. For example, Cat bolts exceed Grade 6 in all requirements as rated by the Society of Automotive Engineers. Grade 5 is the average rating of bolts used in other earthmoving equipment.

WHAT GRADE OF BOLTS DO YOU USE?

Here's what's normally stocked at...	Hardware Stores, Automotive Outlets	Industrial Supply Houses, Other Mfr. Outlets	Special Order Only	Caterpillar Dealers
SAE	Grade 0-3	Grade 5	Grade 6	Exceeds Grade 6
Minimum Tensile Strength (Breaking point)	55,000-110,000 PSI	105,000-120,000 PSI	133,000-140,000 PSI	142,000 PSI
Hardness Rockwell Rating	RC 0-28	RC 19-32	RC 28-36	RC 30-38

If you need tougher, stronger hardware—get Cat all-purpose bolts and nuts. You can count on them to do a better job longer because they're stronger and harder than others.





HERE ARE OTHER CAT BOLT BONUSES YOU GET. *Heads* are higher and full size—easy to get wrenches on. *Flats* are hard and parallel—corners don't round off, are easy to grip. *Threads* are rounded at the roots and free from laps and burrs. *Points* are smooth and uniform. *Ends* are precisely rounded or chamfered—cross-threading doesn't occur. *Washer faces* are flat and have uniform thicknesses. *Heads and threads* are concentric to shaft—heads and nuts fit flush.

NUTS AND LOCK WASHERS are matched to every size bolt to give complete top-quality fasteners, too. Nut threads resist stripping. Corners do not round. Clean, smooth-fitting threads make installation fast and easy. Lock washers have smooth surfaces for maximum wear and strength.

When you need the best bolts and nuts to keep your machinery and other equipment together, see your Caterpillar Dealer. He has a large selection.

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

SERVICE TIP: Get your free copy of Caterpillar's bolts and nuts reference booklet at your Caterpillar Dealer today. It has the sizes, threads and part numbers listed for quick, easy ordering. Before buying any hardware, check Cat prices first.

CATERPILLAR

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FEB 10 1960

PIPE LINE INDUSTRY

A GULF PUBLISHING COMPANY PUBLICATION

February 1960 | Vol. 12, No. 2

CONTENTS and Quick Look

To help you put first things first, scan these time-saving digests, checking ☑ those you want to read first.

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FEE 11 1960

Editorial Index Now Available

The Editorial Index is now at the printers and soon will be ready for distribution. The 1959 Editorial Index provides a time-saving entry into all 12 issues of PIPE LINE INDUSTRY published in 1959.

Bound in a handy pamphlet form, the Editorial Index lists each and every article and its author. To get a copy, write the Librarian, Gulf Publishing Company, P. O. Box 2608, Houston 1, Texas. Or, if you prefer, check the square provided on the blue Reader's Service Card at the back of this and every issue of PIPE LINE INDUSTRY.

Be assured of getting your copy by ordering your Editorial Index now. The supply is limited.

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PIPE LINE INDUSTRY published every month. Entered as second class mail matter July 9, 1954, at the post office at Houston, Texas, under the act of March 3, 1879.

What Lube Oil Analysis Can Tell You About Engines

☐ A highly practical tool for engine preventive maintenance is lube oil analysis. You can spot troubles ahead of time through proper interpretation of the basic lube oil tests. These case histories and an analysis sheet can prove to be a vital addition to your preventive maintenance.

By W. E. Scruggs ..... Page 40

Machine Forms Pipe In the Ditch!

☐ This is not the long awaited "pipe line machine!" It does lay continuous pipe—but it is concrete pipe! It forms the pipe over a 300-foot long inflatable tube at about 8 feet per minute. Page 46

Answer to the Third Overload Relay Question

☐ This is a controversial question among electrical engineers. However, no one can deny that under certain conditions, three-phase motor starters can save a motor. Here is a simple and inexpensive way to add the third relay.

By R. A. Gerg ..... Page 47

Get More Mileage Out of Those Older Horizontals

☐ In the gas transmission industry it is not always possible to replace engines to get top efficiency. The trick is to do the best with the engines on hand. Cities Service improved efficiency of old horizontals by (1) revising ignition systems; (2) improving lubrication—even to the extent of copying pushbutton greasing found on modern autos; (3) improving bearings. ..... Page 49

Tanker Loading Lines That Rise Out of the Sea

☐ In the past, the flexible hose at the end of offshore lines was left in the mud between tanker loadings. A new hoister which has compressed air operated ballast tanks has solved the problem and now speeds cargo loading and discharge in the Persian Gulf.

By R. C. Ledford ..... Page 51

The Fine Art of Human Relations

☐ You can buy a man's time. You can buy a man's physical presence in a given place. But you cannot buy initiative, loyalty or enthusiasm. These have to be earned.

By Stephen G. Henry ..... Page 55

How to Simplify Motor Power-Factor Corrections

☐ Using two handy charts, and a straight edge, you can determine how much capacitance is needed to correct the power factor of an induction motor and what power factor will be obtained with a given capacitor and motor.

By G. B. Brooks ..... Page 60

Why wait another year?

THE STALL is on again.

Natural gas producers still are waiting for a clearly-worded Administration statement supporting legislation that will free them from utility-like federal controls.

The statement was expected to be included in President Eisenhower's budget message to Congress. It wasn't there. And no one seems to know why, particularly after Cabinet members recently expressed near-unanimous support for decontrol in talks with producers.

Unless Administration support is publicly expressed, little hope is seen for Congressional action on a decontrol bill in 1960—despite the efforts of the Texas Independent Producers and Royalty Owners Association and other producer groups. The general theme in Washington appears to be, "Leave 1960 alone, but lay the groundwork and be ready to go in 1961."

So, after 5½ years, two natural gas bills and two presidential vetoes, efforts to clarify federal regulation of natural gas producers are more muddled than ever. Following are recent developments in brief:

• Oil industry leaders, Senate Majority Leader Lyndon Johnson and the co-author of two natural gas bills, Oren Harris, have publicly stated that no action is expected unless the Administration makes some strong recommendations and then gives them strong support.

• Taking the other tack, Interior Secretary Fred Seaton recently urged the industry to take the lead in initiating a bill that would both simplify federal regulations and provide ample protection for consumers. He refused to commit the Administration to any direct action on a new natural gas bill.

While the traditional, progress-curbing see-saw of political inaction runs its multi-year course, the Federal Power Commission continues to reel under a staggering backlog of rate cases—natural gas drilling efforts are slackening—the rate of additions to reserves is slowing down—more and more producers are selling gas under intra-state contracts to avoid the stifling red tape of federal control.

As a result, before long the entire nation will be suffering. Thousands of potential customers will be left dangling on the waiting list to receive a cheap, clean, highly efficient fuel.

It is high time that natural gas be taken out of the "political football" category. And there could be no better time than 1960.

Several factors favor such action, despite indications to the contrary. The Administration has indicated it is vitally interested in straightening out the natural gas mess. Also, an increasing number of natural gas distributors are easing up on their opposition to reduced producer controls.

But there still remains some powerful groups whose efforts to tighten federal control continue unabated, i.e., city and state officials, competing fuels.

Even so, the path can be cleared to workable legislation in the near future—if statesmanship and responsibility are executed on two fronts:

1. Industry and government must drop their "let the other guy do it" attitude. And, after two vetoes, the scales lean heavily toward the Administration taking the initiative.
2. Intra-industry haggling must stop. Producers, transmission companies and distributors must join together in a common effort.

These are the prerequisites. Adopt them and the nation's economy takes a giant step forward. Ignore them and a vital industry continues indefinitely to wallow in the mire of political inaction.

Which will it be?

AND NO SWEAT

Absolutely "no sweat" when every weld has been examined on Ansco Industrial X-ray film!

Experienced pipeliners like the uniformity and dependability of Ansco films under every condition. They depend on Ansco for easy readability and revealing gradation that clearly detects even the most elusive flaws.

If you have never used Ansco Industrial X-ray materials in your work, contact your local Ansco representative. He will show you how to set up a "no sweat" operation with Ansco. Ansco, Binghamton, N.Y., A Division of General Aniline & Film Corporation.

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FLEXIBLE ROCK SHIELD...

A durable pipeline protector. Guards pipelines in rocky and swampy areas, and at river, railroad and highway crossings. Also used to make tough saddle pads for river weights or hold-down anchors. Can be applied either in two pieces or by the cigarette wrap method. ½" or ¾" steel strapping with aluminum seals or use of filament tapes insures permanent placement of the shield. Saves time and effort. Light weight cuts freight cost.

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PETROLEUM REFINER and The REFINERY CATALOG for the oil, gas and petrochemical processing industry.

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Indexed by Engineering Index

multi-purpose= maximum economy

Humble NEBULA EP-1 multi-use grease replaces several ordinary greases and gives you these economies:

- You buy one grease in quantity—save on quantity discounts;
- Your storage requirements are kept to a minimum;
- Your record keeping and inventory are simplified;
- You always have the *right* grease handy.

NEBULA EP-1 is top choice for the tough jobs because of its exceptional resistance to the effects of heat, water, oxidation and heavy loads. Order NEBULA EP-1 from your nearest Humble bulk plant in Texas, New Mexico and Arizona. Other areas contact Humble Oil & Refining Company, Houston, Texas.

NEBULA EP-1

is available in pails, drums and in handy cartridges.

HUMBLE OIL & REFINING COMPANY

For more data on advertised products, use Readers' Service Cards, last page.

HERE'S ANOTHER REASON WHY
FORD TRUCKS ARE YOUR BEST BUY!

"REGARDLESS OF THE TERRAIN— MUD FIELDS... SAND... SWAMP BEDS—WE DEPEND ON OUR FORDS TO DO THE TOUGHEST JOBS"

SAYS ARNOLD J. LEWIS, MAINTENANCE FOREMAN, FARM BUREAU OIL COMPANY, INC., MT. VERNON, INDIANA

"Our trucks can be found anywhere within a 250-mile radius of Mt. Vernon transporting men and equipment needed for every phase of the oil business. We usually put our 28 Ford Trucks on the toughest jobs because we can depend on them to keep going even if they have to winch themselves out.

"The performance of our Fords is truly outstanding, when you consider that many of our jobs take us along river banks and through plowed fields with mud axle-deep.

"The engines are used just as much for winching and driving other equipment during field operations as they are for highway driving. In two years we get up to 140,000 engine miles on our Fords before we trade them in. During that time we change the oil and oil filter every 2,000 miles and seldom add any oil between changes.

FORD F-600 shown above has a special utility bed designed and built in the Farm Bureau Oil Co. shop. It features a power driven pipe-threading attachment, heavy-duty winch, gin poles, headache rack, rolling tailboard, two-way radio plus both arc and gas welding equipment.

FORD TRUCKS

"In this connection I might add that engine and accessory maintenance is much easier on the newer Fords since they have enlarged the engine compartment.

"Excellent parts availability is another reason why we use Ford Trucks on our toughest jobs ... and we can always get Ford parts at a reasonable price.

"We haven't bought any '60s yet, but it appears that Ford has many new and improved vehicles to choose from and I am sure that we will be purchasing them as we have in the past."

Big Fords for '60 are built for longer life . . . with Certified Durability!

Whatever your job . . . wherever you do it . . . you'll discover just as Mr. Lewis did, that Ford Trucks are the best investment you can make for your transportation dollar.

Certified results of tests conducted by America's leading independent research organization* confirm the fact that Ford Super Duties have been refined for added durability! For example . . .

Automatic radiator shutters reduced the coolant temperature variation recorded in severe mountain road tests from a 79° range to a 20° range. Engine operation with coolant temperatures in the 167° to 187° range means less expansion and contraction, more efficient combustion and better lubrication . . . all of which contribute to longer engine life.

Dynamometer tests showed *no vapor lock* with Ford's submerged-type electric fuel pump at temperatures up to 200°. Incipient vapor lock with mechanical fuel pump resulted in a power loss of 9% under the same conditions. Shaker table tests plus constant exposure to oil, water and heat proved 1960 wiring harness to be *three times longer lived.*

Test results plus the experience of satisfied users are important, but that is not all. For 1960, the Super Duty line has been broadened to provide even more flexibility in power train options. See your Ford Dealer!

**Name available on request*

COST LESS

LESS TO OWN . . . LESS TO RUN . . . BUILT TO LAST LONGER, TOO!

For more data on advertised products, use Readers' Service Cards, last page.

MEN WANTED
for hazardous journey, small wages, bitter cold, long months of complete darkness, constant danger, safe return doubtful. Honor and recognition in case of success.
Sir Ernest Shackleton

would you answer?

People scoffed when the explorer, Shackleton, placed this ad in a London newspaper. Who would answer? Thousands did! Risking life in the Antarctic or facing a thorny problem in industry, man always responds to challenge.

Natural gas, for example lay idle under the earth. How could it be put to work? This challenge created the long distance pipeline. Today, through our 11,000-mile system, 18 key states are supplied with the world's finest fuel. Natural gas! More than 2 billion cubic feet daily... the equivalent of over 100,000 tons of coal.

Delivered dependably and economically 'round the clock in any weather.

From natural gas and oil... heat, power, petrochemicals that mean ever wider service to man.

TENNESSEE GAS TRANSMISSION COMPANY

HOUSTON, TEXAS

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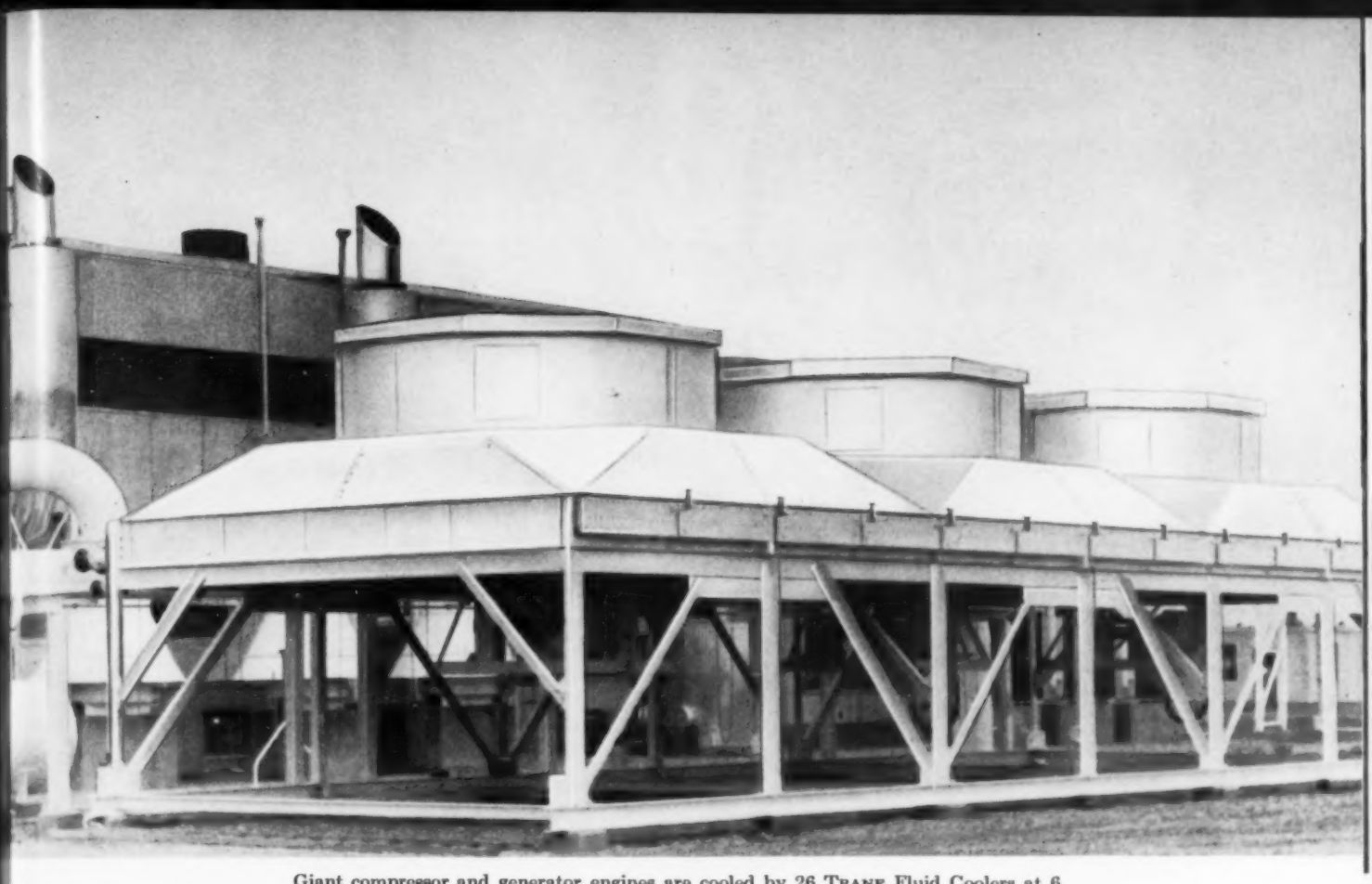


Giant compressor and generator engines are cooled by 26 TRANE Fluid Coolers at 6 Trans-Canada stations. Both horizontal and vertical air discharge types are used.

Trans-Canada, longest gas pipeline in the world, chooses Trane Fluid Coolers to cool engine water!

The Trans-Canada Pipeline System—2,294 miles long—provides market outlets for reserves of Alberta natural gas, serves Western Canada, and the great industrial areas of Eastern Canada.

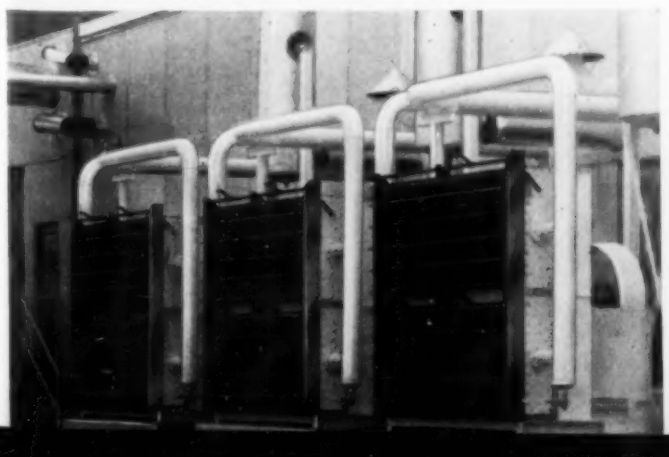
Because this pipeline passes through country where winter temperatures are very low, it was necessary to install engine jacket water cooling equipment that would function at 40 degrees below zero!

Trans-Canada chose TRANE Fluid Coolers for this important job. 26 TRANE units serve the initial six compressor stations. Air cooling was considered essential—and TRANE Fluid Coolers have shown that they can operate efficiently under all weather conditions.

More and more transmission companies are turning to TRANE for cooling equipment. Many have reported simplified maintenance, a minimum of adjustment problems. And engineers *know* that they can depend upon the accuracy and completeness of TRANE capacity ratings—tested in the industry's most complete laboratory, where as many as 90 different temperature readings are taken across the face of a heat transfer section!

When you have a fluid cooling problem, turn to TRANE! Just call your nearby TRANE Sales Office—or write TRANE, La Crosse, Wisconsin.

Small TRANE Horizontal Air Discharge Coolers cool the engines used to drive the 250-kilowatt generators (three per station) which supply electrical power on stations not served by a utility.



For any air condition, turn to

TRANE

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

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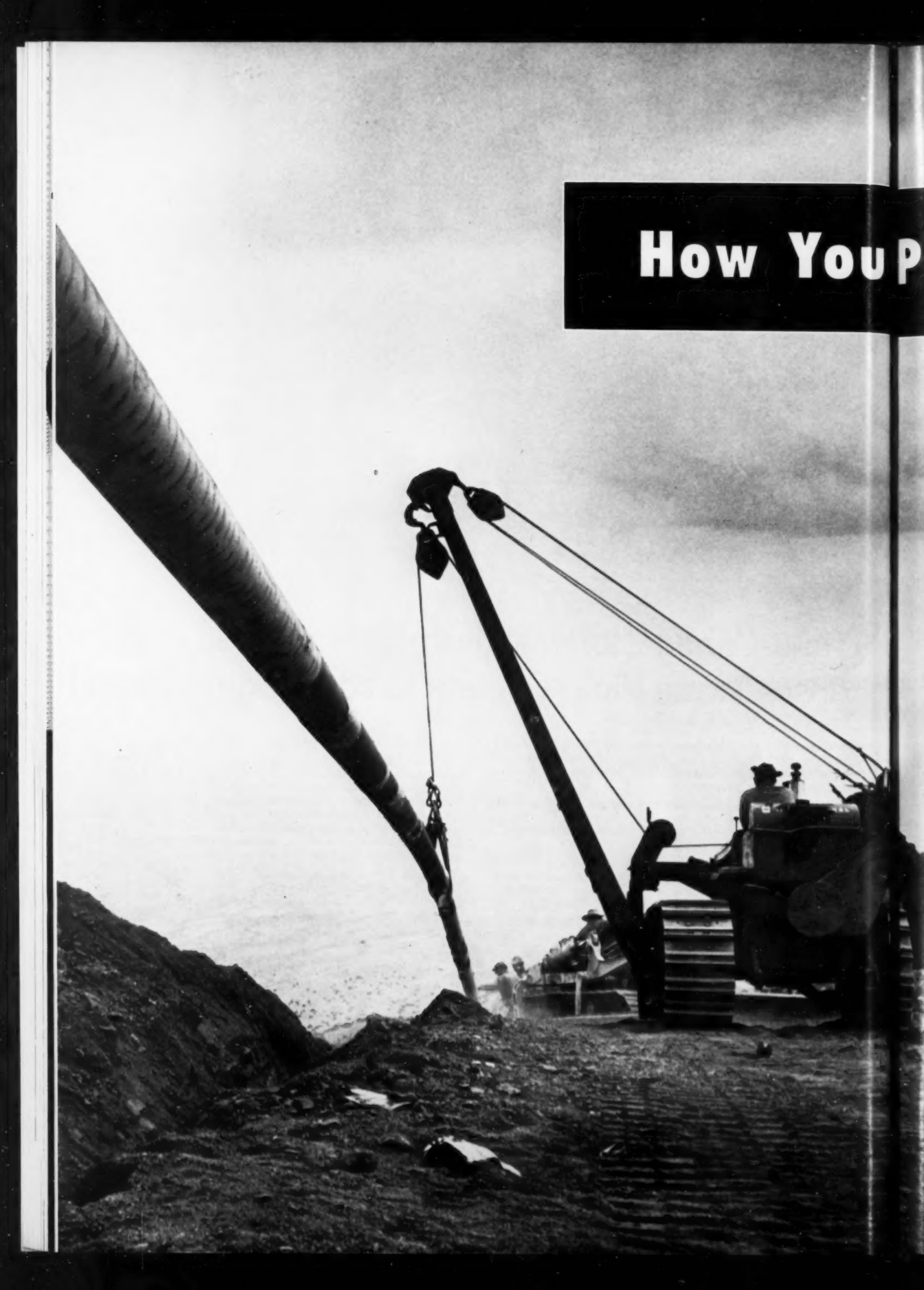

How YouP

u Profit with J&L Electricweld

J&L Electricweld Line Pipe insures fast economical pipe line construction. Uniform high ductility means easier field bending. Lengths are uniformly round. They line up end to end in perfect butt joints with uniform bevels for fast dependable welding. Multiple testing of every length of *J&L Electricweld* is your assurance of better performance during installation and during operations.

(1) After the pipe is welded, the weld area is annealed and subjected to an ultrasonic inspection.

(2) Every length is pressure-tested under the specified A.P.I. or A.S.T.M. hydrostatic test requirement. Pneumatic hammers strike the pipe while it is under pressure to build up pressure surge.

(3) A series of visual inspections is made on every length of *J&L Electricweld.*

(4) Every length of pipe is given a crush test to determine weld strength and steel quality. The test complies with requirements of A.P.I. 5L, 5LX and with A.S.T.M. A-53, A-135 and equivalent specifications.

(5) Both ends of every joint of *J&L Electricweld Line Pipe* receive a magnaflux examination.

J&L Electricweld is available in sizes 6⅝" O.D. through 12¾" O.D.

Discover how you can profit by using this high quality pipe in your next line. Call your local J&L Supply man today.

Jones & Laughlin

SUPPLY DIVISION – Tulsa

If it's sold by J&L....
It's the best available

PLICOFLEX

PLANT IN HOUSTON INCREASES OUTPUT OF

THE BETTER TAPE COATING

PLICOFLEX
TRADE MARK

Plicoflex, the line proved protective tape coating, combines butyl rubber and polyvinyl chloride to give these important advantages:

1. *Shock Impact Resistance*
2. *Moisture Migration Proof*
3. *Built-in Color Coding*
4. *Economical Installation*
5. *Permanent Bond*
6. *Fungus Proof*

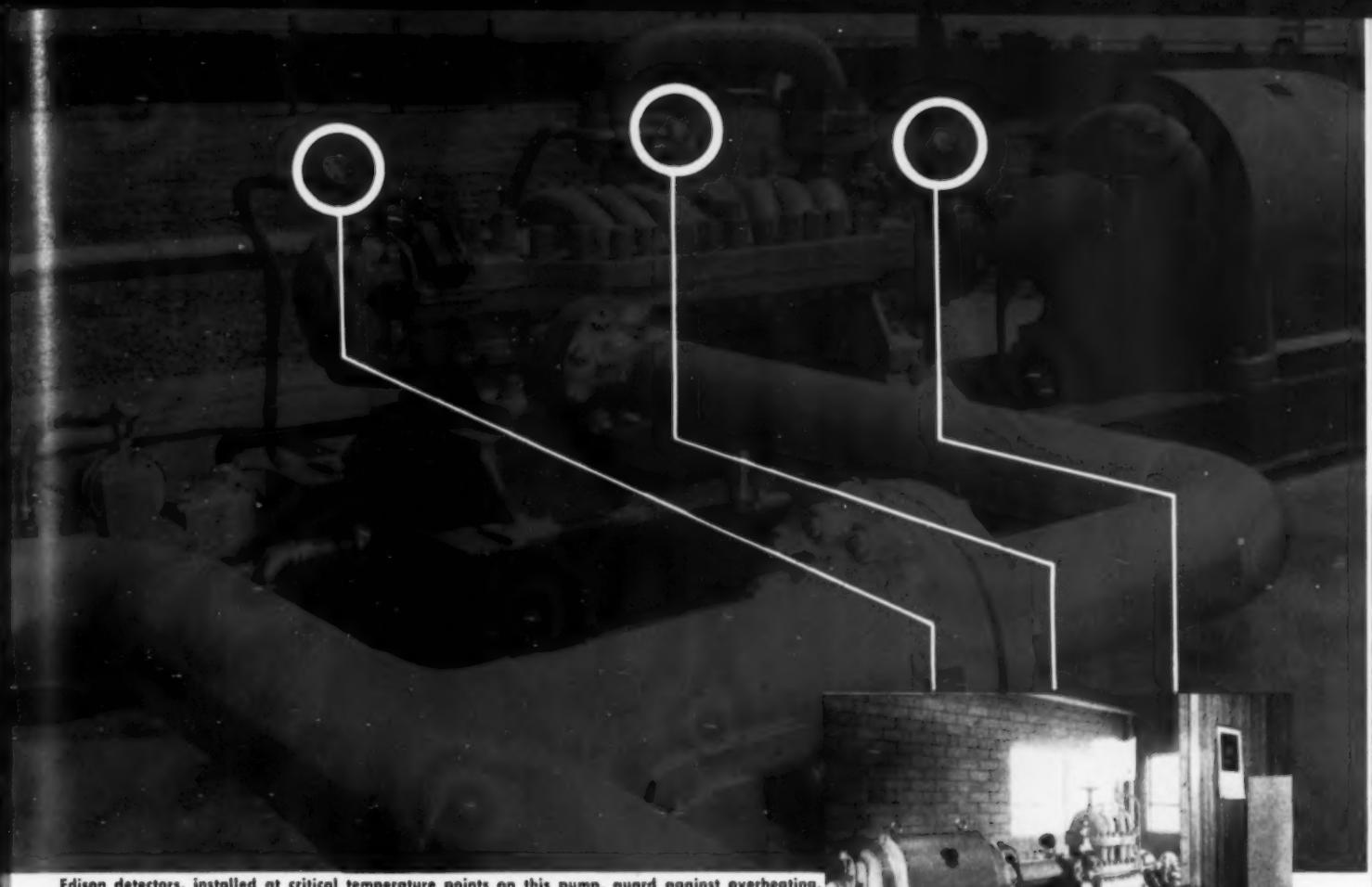
The outer layer which is of vinyl now contains flame resistant chemicals. It provides strength, toughness, abrasion resistance, and permanence. With the butyl side applied against the primed surface, crevices and scratches are filled, leaving no gaps between tape and pipe.

Available in 10 colors Plicoflex tape coating (No. 340) comes in widths from 1 to 18 inches and in thicknesses from 15 to 35 mils. *Write for folder giving complete technical details.*

PLICOFLEX, INC.

P. O. Box 45911 Houston 45, Texas
JAckson 6-3711 Teletype HO 277

Efficient new Houston plant facilities give you improved quality tape at reduced prices.



Edison detectors, installed at critical temperature points on this pump, guard against overheating.

THOMAS A.

EDISON

omniguard systems protect unattended pipeline booster stations

To pump more oil at less cost, pipe line operators use satellite booster stations. These stations are unattended. In order to protect critical equipment operators rely on Edison Omniguard temperature monitoring systems.

Omniguard detectors are installed at critical temperature points such as inboard and outboard sleeve bearings on the motor, inboard and outboard ball bearings on pump. In addition, they monitor pump casing temperature, and temperature of oil on discharge side of pump.

Indicating panel is usually located in supervisory station miles away. In event of overheating, pumping motors are immediately shut down and information is automatically relayed to supervisory station. Trouble-shooting personnel are quickly dispatched to put station back in operation, or standby equipment can be automatically cut-in by Omniguard.

This reliable, economical system is playing a major role in insuring the continuous, profitable operation of more and more pipe line stations.

If you would like further information about the Edison Omniguard system, write for publication 3036C.

Omniguard and indicating units are installed in control console. Warning system identifies a hot bearing by an alarm light and automatically shuts down the equipment. Indicators enable operator to read exact temperature of all bearings from console.

Pump and motor at pipeline booster station, showing Edison detectors (circled) on inboard and outboard pump bearings and pump casing.

Thomas A. Edison Industries
INSTRUMENT DIVISION
95 LAKESIDE AVENUE, WEST ORANGE, N. J.

McGRAW EDISON

B&W has taken the step...

a NEW PLANT at Beaver Falls for the manufacture of a

COMPLETE LINE OF WELDING FITTINGS AND FLANGES

Beaver Falls, Pennsylvania is the site for B&W's new Welding Fittings plant. When in operation it will be one of the most efficient sources of supply in the industry . . . one that has been designed with product quality as well as customer service in mind. Not only will it have facilities for the manufacture of a complete line of carbon, alloy and stainless steel fittings and flanges, but its location makes possible integration with B&W's other manufacturing operations . . . their steel mills and their tube mills.

This means that

(a) you can get a complete line of welding fittings and flanges

(b) you can get a complete process piping package — welding fittings, flanges *and* tubular products from one source

(c) you can more effectively control both buying and delivery from one manufacturer . . . The Babcock & Wilcox Company

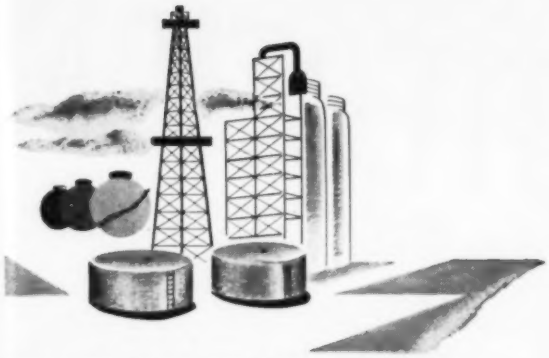
An announcement of the transfer of welding fittings operations from Milwaukee to Beaver Falls will be made in the near future.

For further details ask for bulletin FDM-2016 or call on any of the local B&W District Sales Offices. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.

B&W THE BABCOCK & WILCOX COMPANY

TA-9026-GI **TUBULAR PRODUCTS DIVISION**

Seamless and welded tubular products, solid extrusions, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels and special metals



PETROLEUM INSTALLATIONS

STOP WEEDS

with safe, effective

SIMAZINE *or* ATRAZINE

pre-emergence *pre- or post-emergence*

HERBICIDES

Economical, long residual Geigy herbicides save time and money—do the job right the first time. One application stops weeds before they start—gives you season long control.

Safe to humans and animals, non-irritating to skin, non-flammable, non-corrosive to equipment. Safe to use on valuable land. Available through leading distributors.

FREE BROCHURE: *New full color booklet contains complete directions, diagrams, applications and other useful data for both Simazine and Atrazine.*

MAIL COUPON TODAY

GEIGY AGRICULTURAL CHEMICALS,
Division of Geigy Chemical Corporation
Saw Mill River Road, Ardsley, N.Y., Dept. P-2

Send free weed control brochure to:

*Name*_____

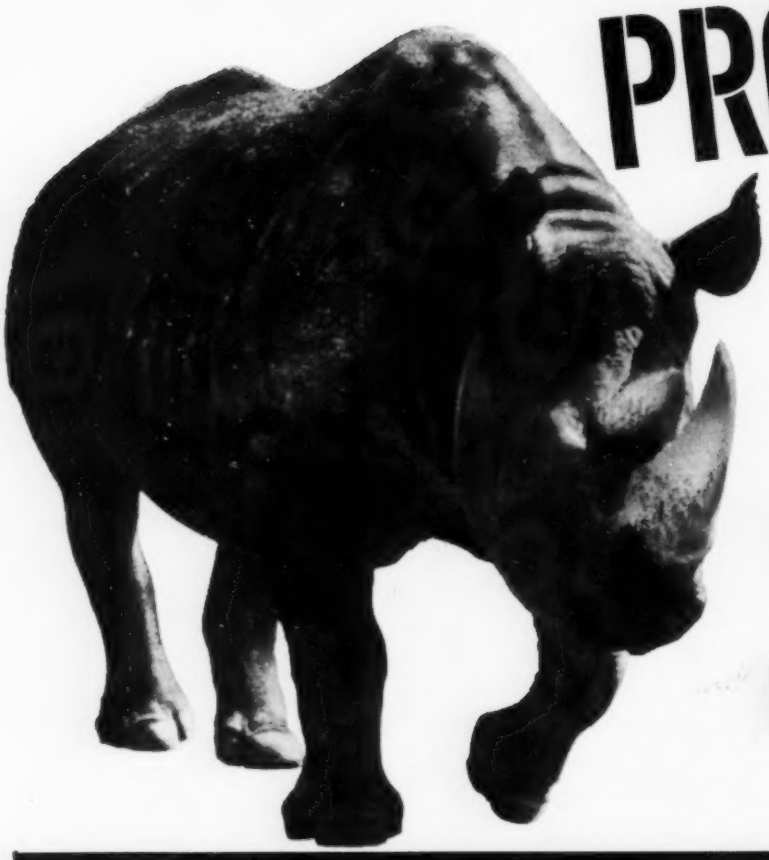
*Company*_____ *Position*_____

*Address*_____

*City*_____ *State*_____

Geigy *ORIGINATORS OF DDT INSECTICIDES*

For more data on advertised products, use Readers' Service Cards, last page.



PROTECTION *is our business*

TOUGH IS THE WORD FOR NICOLET ASBESTOS PIPE LINE FELTS

WHATEVER THE SOIL AND CLIMATIC CONDITIONS you encounter in the course of pipe line construction, there is at least one Nicolet Pipe Line Wrap that will give your pipe line the best possible protection.

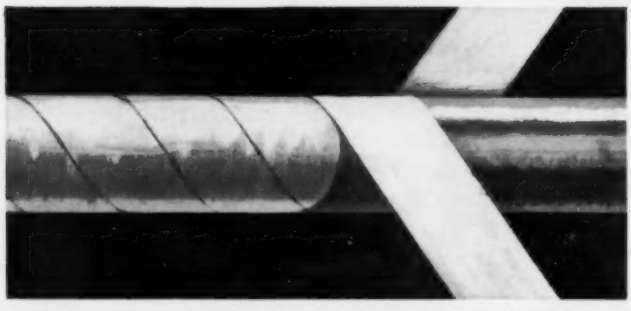
You can pick from either the popular #15 "Standard" or the #8 "Tufbestos". Both are Tar or Asphalt saturated Asbestos, Glass Reinforced, Perforated or Non-Perforated (#15 "Standard" is also available without Glass Reinforcement).

Or, you may need that growing favorite, Nicolet Reflecto Asbestos Pipe Line Felt. This is a strong, tough and light weight Wrap that handles easily and is economical to ship. It has built-in neoprene and is Glass Reinforced and Perforated. It is a white Wrap that is capable of reducing enamel temperatures as much as 30%.

Find out for yourself the many advantages of using the toughest—specify Nicolet Asbestos Pipe Line Felts.

Write today for samples and full specifications.

Distributed throughout the United States • District Sales Offices: Ford & Washington Streets, Norristown, Pa.; P.O. Box 777, Hamilton, Ohio



NICOLET INDUSTRIES, INC.

FLORHAM PARK, NEW JERSEY

Suction pressure, discharge pressure, rate of pressure change, and more complex combinations with pump motor current override, etc., are all being controlled by **GPE Controls** equipment in stations that are unattended 24 hours a day. Weatherproof transmitter-controller-hydraulic relay package eliminates control panel and enclosure, cuts installation cost. Cylinder thrusts to 5 tons and more for maximum accuracy under all conditions. No instrument air required. Extremes of temperature do not affect operation.

GPE Controls | A GENERAL PRECISION COMPANY

Write for descriptive literature

GPE Controls, Inc.

240 East Ontario Street • Chicago 11, Illinois

A Subsidiary of GENERAL PRECISION EQUIPMENT CORPORATION

If you need a brush cutter like this– we've both been missing a bet!

We're a little ashamed to admit we've never tried to sell the pipe line industry these cutters. You see, Servis Equipment Company *originated* the tractor powered brush cutter. And as the picture indicates, ten years later we're still producing the most rugged cutters made.

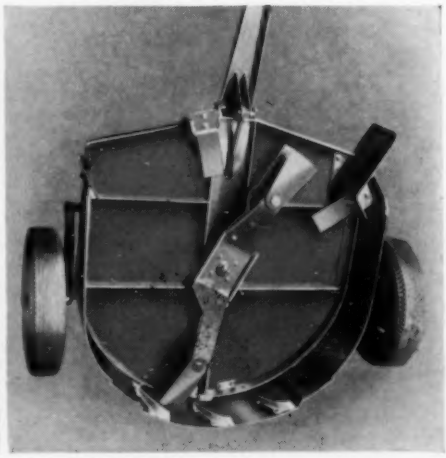
Sticking too close to the farm has been our trouble. Of course, we *have* sold to state highway departments and to the Air Force, but the red tape was so involved that we found it more efficient to concentrate on the farmers . . . even in South America and Africa.

A pipe liner in West Texas bought one of our Gyro 66 Brush Cutters the other day. It cut up tough mesquite brush on his right of way like nothing had before. He was so enthusiastic, he said we ought to tell other pipe liners about it, gave us the name of this publication.

It's true, Servis cutters will take on the toughest job — we've demonstrated them on a row of 4" x 4" posts. The secret is in low tip speed, but extra heavy blade assembly for tremendous momentum.

We have dealers from Carlsbad to Caracas. There's one near you. Clip the coupon and send for his name.

Underside shot shows heavy construction, A-shaped blade carrier, optional extra blades for fine shredding.



Servis EQUIPMENT CO. DALLAS, TEXAS

Servis Equipment Company Dept. J
1000 Singleton Blvd.
Dallas, Texas

Please send me information on items checked.

Name_____

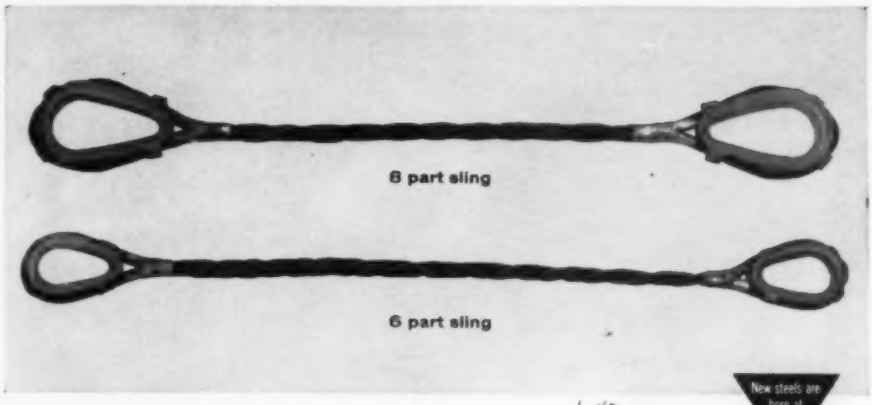
Address_____

City_____ State_____

Type Tractor Owned_____

- ☐ Gyro 140" Shredder (Pull-type)
- ☐ Gyro 84" Brush Cutter (Pull-type)
- ☐ Gyro 66" Shredder (Pull & lift models)
- ☐ Gyro 60" Shredder (Pull & lift models)
- ☐ E 60" Clipper (Pull & lift models)
- ☐ BM 60" Mower (Belly mount)
- ☐ Pasture Renovator
- ☐ Whirlwind Terracer
- ☐ Hudson Automatic Row Marker
- ☐ Dump-type Rake
- ☐ Soil Scraper
- ☐ Lone Star Blade (light, 6')
- ☐ 3-Way Ditcher-Terracer Blade, 6'
- ☐ Heavy Duty 3-Way Blade, 7'
- ☐ No. 7 Angledozer (w/Brush Rake at'chmt) (Row crop tractors)

"Make Pay Dirt Pay More — Join Your Soil Conservation District"



Now Tuffy covers all the bases...

NEW HAND-BRAIDED SLINGS

are added to the UNION line

Union Wire Rope Corporation, makers of famous Tuffy patented, 9 part, machine-braided slings, now bring you top quality hand-braided slings. Meet the new members of the Tuffy team:

The hand-braided 6-part sling provides wide bearing area; greatest single-plane flexibility; least strength loss under severe bending; high cutting and twisting resistance.

The hand-braided 8-part sling provides extra wide bearing area, gives extra flexibility in all planes, low strength loss in bending, highest resistance to kinking and spinning.

Like the entire line of Tuffy slings and hoist lines, these new slings are the product of extensive field and laboratory research. They're specially designed for extra strength and flexibility. Tight end-braiding keeps component parts equal in length so that each rope carries its full share of the load.

In these new slings you'll get quality backed by Union Wire Rope experience and integrity. And you'll get a bigger dollar valve in longer service life with greater safety.

Your Tuffy Distributor Will Help You Save Money on Every Sling and Wire Rope Use

He's the man to see when you're replacing or adding slings, hoist lines and wire rope. He is set up for fast service, backed by his nearby Union Wire Rope branch office and warehouse staff and factory engineers. Get in touch with him.

Tuffy® Tips —on safe use of Slings and Hoist Lines

Professional Weight Lifters Work the Safety Angles

Here's a tip that could save an injury and absenteeism. The weight lifter's secret is proper leverage. Plus use of major leg muscles instead of back muscles. He never leans over to pick up the load. He squats down as near as possible to it. Lifting action comes from legs and thighs. If your workers must use muscles for some of the lighter lifting jobs, these points are worth remembering. But wherever possible—and always for heavy loads—use hoists and slings.

More Tips for Reducing Materials Handling Accidents

1. Teach your workers rated load factors. Warn them not to overload slings.
2. Use the right size hoist for every heavy lifting job. Don't put the load on muscles.
3. Show workers how to rig hoists properly and safely.
4. Inspect hoist load brakes often. Slipping or dragging brakes are a hazard.
5. Be sure to use the proper sling for the job. Don't assume that all slings made of wire rope are right for all lifting jobs.

FREE!
New Tuffy Sling Handbook

All about slings from A to Z, including types, dimensions and rated loads. Address **Union Wire Rope Corporation, 2278 Manchester Ave., Kansas City 26, Missouri.** Specialists in high carbon wire, wire rope, braided wire fabric, and stress relieved wire and strand.

UNION UNION WIRE ROPE *Wire Rope*

Subsidiary of ARMCO STEEL CORPORATION

OTHER SUBSIDIARIES AND DIVISIONS: Armco Division • Sheffield Division • The National Supply Company
Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Southwest Steel Products

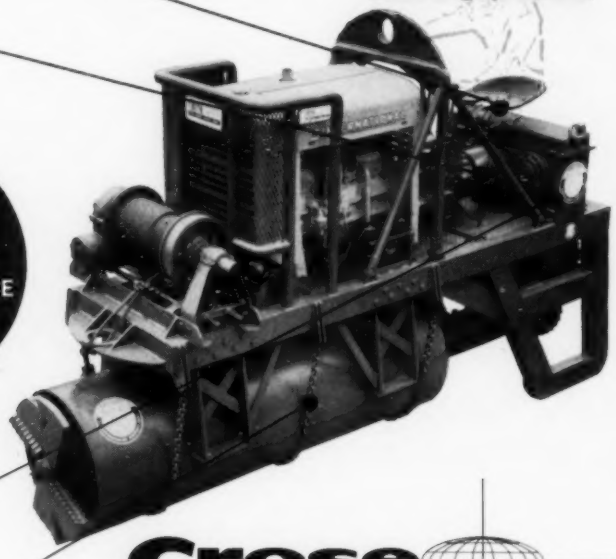
CENTER SEAT FOR OPERATOR — Sitting in seat located directly over center of machine, operator can keep casing lined up perfectly with hole being bored.

REVERSE-O-MATIC TRANSMISSION — With this new type transmission, operator can switch auger from forward to reverse without engine slowdown. No gear shifting.

HEAVY DUTY TORQUE CONVERTER — For full, constant speed and smooth power flow, eliminating up to 90% of shock load imposed on drive train.

CROSE

NEW ROAD BORING MACHINE



The new Crose Road Boring Machine provides the fastest, simplest, most economical way for boring crossings and installing casings up to and including 42" in diameter. Heavy duty torque converter and reverse-o-matic transmission deliver full, constant speed and smooth power flow . . . let you switch auger from forward to reverse without engine slowdown . . . no gear shifting.

FIELD-TESTED TOP PERFORMANCE

The smaller Model RBA Crose Road Boring Machine is still available for casing up to 24".

WRITE CROSE TODAY FOR COMPLETE INFORMATION

NEW GEAR AND CHAIN BOX — With pressure lubrication feature — has been added to the new Crose Road Boring Machine for greater power capacity.

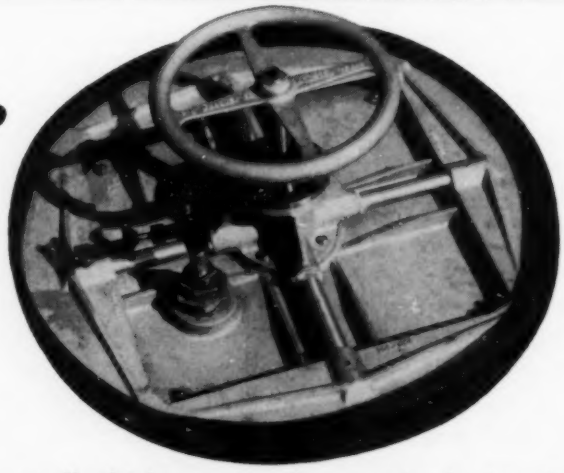
CASING CLAMP BANDS ELIMINATED — Instead, you use adjustable casing chains which can be easily installed or removed when machine is in ditch.

Crose perrault EQUIPMENT CORP

2765 Dawson Road • Phone WEbster 6-2171 • Tulsa, Oklahoma •
BRANCH OFFICES: Houston, Texas • Elizabeth, N. J. • IN CANADA:
Edmonton, Alberta • Toronto, Ontario • EXPORT OFFICE: New York, N. Y.

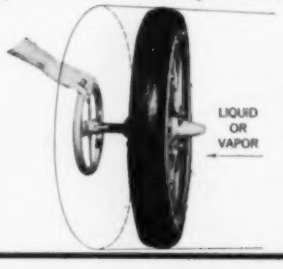
Finally....

A PRACTICAL PIPE LINE END PLUG



The Maloney Pipe Line End Plug is a rugged, light weight unit for positive sealing of Pipe Lines during repairs or construction. Designed to eliminate air entering or liquid/gas draining from the line, the Maloney Pipe Line End Plug will provide a vapor seal on pipe of **any** wall thickness in the nominal size for which designed.

Rugged aluminum body, with a specially designed sealing rubber, is light weight. Even the "Big Inch" sizes are a one-man installation. Merely slide the unit in the line and lock tight with the hand wheel.



Equipped with a vent for safe "breathing" action. Available in all sizes from 14 inch through 36 inch.

F. H. Maloney COMPANY

Write for literature to: P. O. BOX 1777 • HOUSTON 1, TEXAS

Here's why a GROVE G-5 never needs maintenance

The big reason you can hook up a Grove G-5 and forget it is the famed Grove full opening "big valve" design. You get (1) precision ground, chrome plated and polished side plates for positive metal to metal seal, backed by (2) proven Grove protected Seal-O-Rings on both sides of the gate, for (3) up and down stream seal. Because the Seal-O-Rings are on the gate (4), they are out of the flow at all times, protected from damage caused by contaminates in the bore.

The big plus feature — Grove G-5 valves never need lubrication. Grove series 150 G-5 valves are available in lever or handwheel operated models, sizes 2" through 36".

GROVE VALVES

GROVE VALVE and REGULATOR COMPANY

A Subsidiary of Walworth

65th and Hollis Street, Oakland 8, California

Houston • Los Angeles • Odessa • Tulsa • Denver • Chicago
New York • Dallas • Pittsburgh • Farmington, N. M.
Lafayette, La. • Harvey, La. • Longview, Texas
In Western Canada: Grove Valve Ltd., Edmonton

6278

MEN, MACHINES, IMAGINATION and BETHLEHEM LINE PIPE

Make Commonwealth Loop a Reality

IMAGINATION AT WORK. To wrestle the pipe through the stump-studded mire would have involved too much time and effort. So Latex capped the pipe and floated it into position along the water-filled ditch.

PROBLEM: FIND THE TRACTOR. It took great skill to move in and out of the undergrowth without bogging down or snagging a tree with the boom.

Deep in Virginia's Blackwater Swamp, the Latex Construction Company pushed through a new looping line for Commonwealth Natural Gas Corporation. From Ivor to Suffolk, the men battled mud and water, heat, insects, and dense undergrowth. But they never had to battle the pipe: each length of the 12¾-in. OD Bethlehem electric resistance-weld line pipe proved to be up to specs, and true to round and bevel. Result: the loop was completed on schedule, and approved for service after a single test of 800 psi pressure.

Your next line, too, will go in smoothly if you specify Bethlehem line pipe. It's a top-quality product you can rely on. Just give us a call.

THE FASTEST ROAD—and the cleanest—was often along the pipeline, itself.

BETHLEHEM STEEL

BETHLEHEM PRODUCES LINE PIPE TO 42-IN. OD

Hydraulically expanded electric-fusion-weld API pipe from 18-in. to 42-in. OD in 40-ft lengths with walls to ¾-in. in the larger diameters is made at our Steelton, Pa., plant. Electric resistance-weld pipe from 5¾-in. to 16-in. OD in lengths to 60-ft, and Beth-Co-Weld continuous buttweld pipe up to 4½-in. OD to standard API line pipe specifications are made on our Sparrows Point, Md., pipe mills.

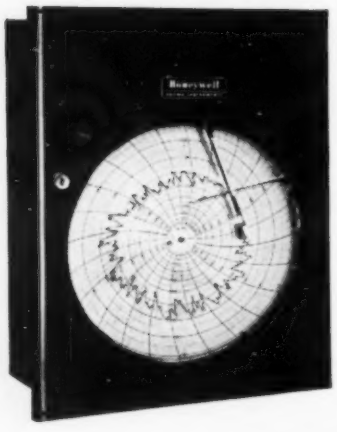
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

Honeywell Bellows Flow Meter

HERE ARE FOUR OF MANY WAYS YOU CAN USE THE BELLOWS FLOW METER

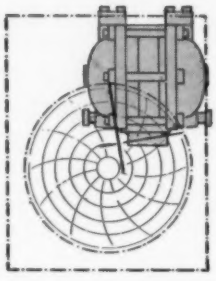


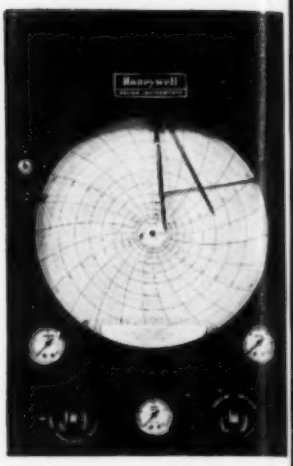
With an indicator or recorder—Indicators can be supplied with or without pneumatic transmission. Recorders can be one, two or three-pen instruments, with the second and third pens actuated by thermometer and/or pressure elements.

With a "blind" transmitter—the non-indicating differential pressure transmitter is used when indication is not required at the process and the variable is to be transmitted to remotely located instruments.

For direct measurement and control

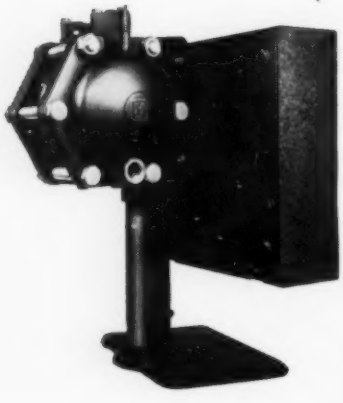
the meter is integrally mounted on indicators, indicating controllers, recorders, or recording controllers.





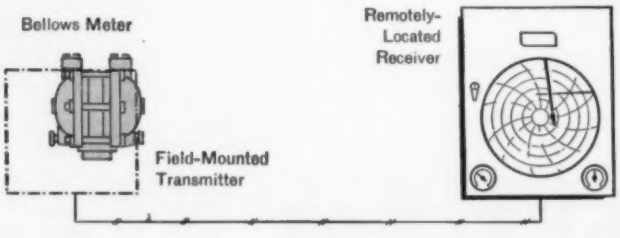
With indicating or recording controllers—All indicators and recorders can be supplied with any pneumatic control form from on-off to three-mode. Indicating controllers are also available with pneumatic transmission.

With an indicating transmitter—Scale is graduated in accordance with the flow or liquid level span of the transmitter. These transmitters are available with pneumatic control to remotely operate final control elements.



For remote measurement and control

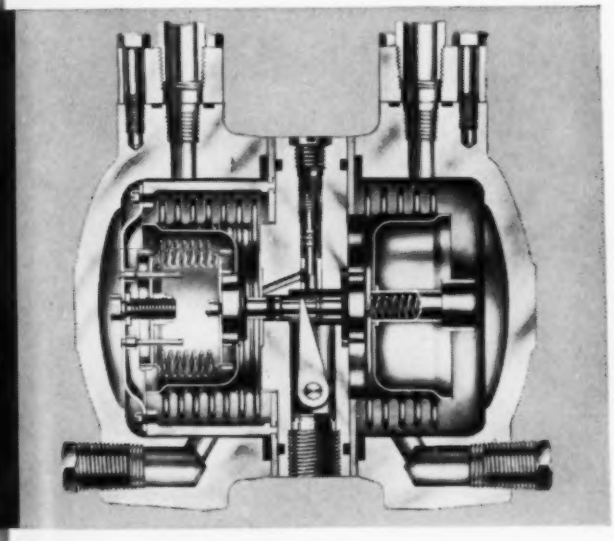
Field-mounted transmitters, either "blind" or indicating, can be used with remotely located indicators, recorders, and controllers.



and with Tel-O-Set miniature instruments and a variety of options!

has applications unlimited

Unequaled for accuracy, stability, versatility in flow and liquid level metering



Transfer of liquid between opposing high and low-pressure bellows converts differential pressure measurement into motion. A torque tube assembly carries the motion outside the meter body to an instrument. Therefore, changes in differential pressure change the instrument reading.

Here's the most advanced meter body available today, with advantages never before found in flow and liquid level meters. Combine the new Honeywell Bellows Flow Meter with the instruments shown on the facing page for truly superior service in metering steam, water, gas, oil and other fluids.

Some of its outstanding features:

Sensitive and accurate—Sensitive to within 0.05% of full scale . . . calibrated accuracy ± 0.5% of full scale.

Leakproof—Between liquid fill and process fluid.

Automatically stabilized—Changes in meter body temperature or static pressure have no effect on output shaft position. Meter operates efficiently in ambient temperatures of minus 40°F to plus 250°F.

Unmatched convenience features—Including fast range changing in the field . . . connections for both horizontal and vertical piping . . . quick calibration and adjustment . . . easy cleaning and servicing.

High corrosion resistance—Seamless, stainless steel formed bellows give long, trouble-free service with virtually all process fluids.

Fast, effective damping adjustment—New type pulsation check with rectangular orifice permits essentially linear damping adjustment . . . and adjustment from outside the meter body during operation.

Models are available in many ranges, for both flow and liquid level measurement and control. Get details on *all* the features of the new Honeywell Bellows Flow Meter by calling your nearby Honeywell field engineer today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

● **REFERENCE DATA: Catalog C22-1**

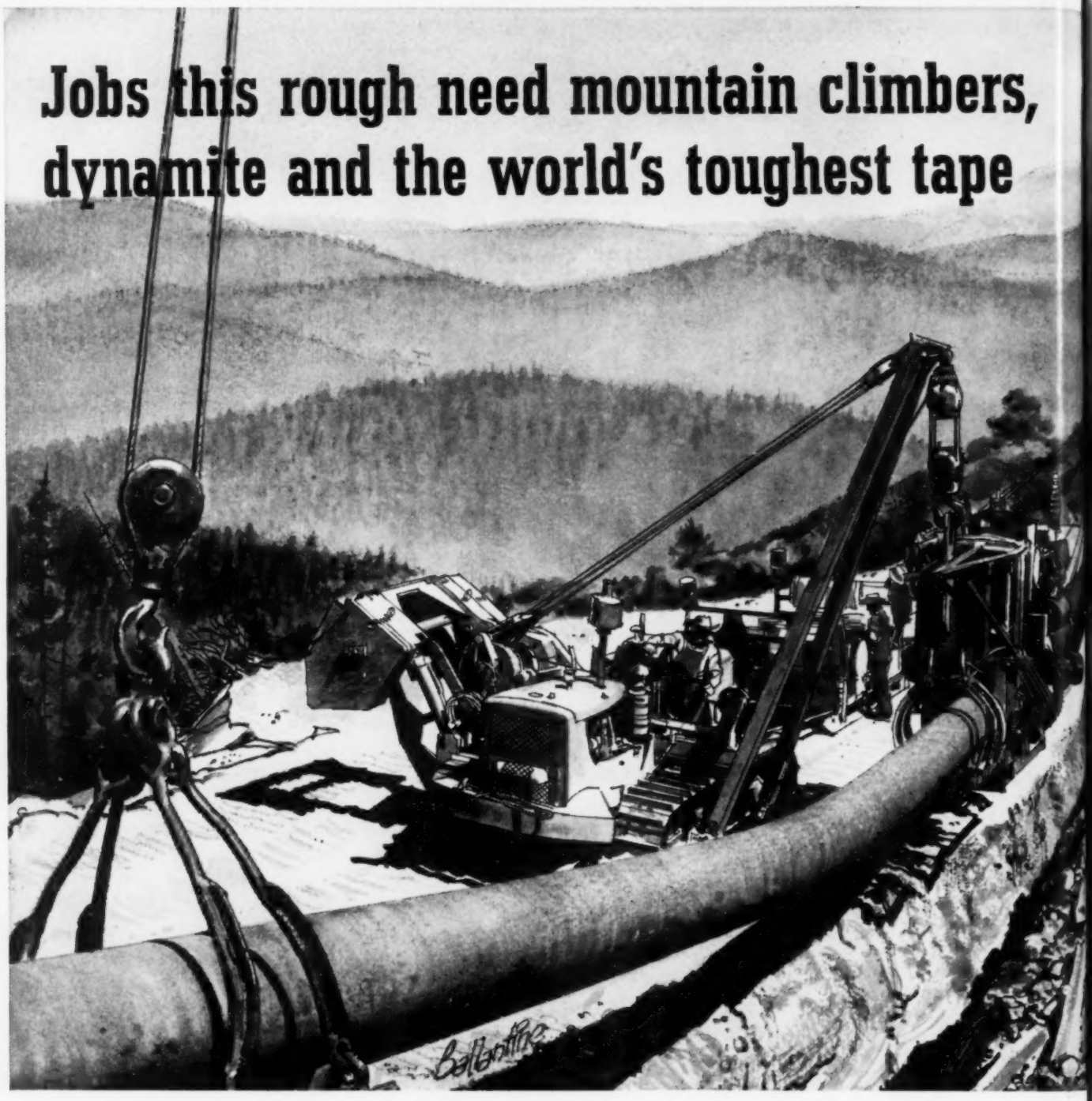
75th YEAR PIONEERING THE FUTURE

Honeywell

First in Control

SINCE 1885

Jobs this rough need mountain climbers, dynamite and the world's toughest tape



New Mandalay line goes through solid rock, up 40% grades, over 8,000-ft. mountains—with Polyken protection all the way

Before they took on 50 grueling miles of treacherous southern California mountains, the Richfield Oil Company people gave their materials a pretty thorough going over. Among other things, they made doubly certain of their protective coating.

Most Practical Protection Yet

They used Polyken's latest development, Extra Strength No. 960 Pipeline Roll. Like a lot of other large companies in recent years, they discovered that Polyken is the toughest, most practical protection you could ask for in modern pipe coating.

Many Hundreds of Miles of Proof

Who are these other companies? There's the Houston Texas Gas and Oil Corporation. They put Polyken tape on 1600 miles of gas line from Louisiana to Florida. The National Iranian Oil Company used Polyken for 200 miles of desert and mountain line. Phillips Petroleum put Polyken on several hundred miles of line in Texas and Canada. Jagged rock, coral swamp,

Using tensioned-spindle equipment, pipe is cleaned and wrapped in one factory-smooth operation. Polyken Tape is ready. No primer, no drying or cooling. No fumes or fire hazards.

burning sand and frozen ground—Polyken is at its best under the worst conditions.

The Question to Ask

When you start inquiring, be sure to ask these companies about relative costs. Compare Polyken with hot dope, and see for yourself how much they saved.

The Polyken method gets more footage *per day*, with far fewer men. With far less equipment and hauling costs. In fact, you have fewer problems all around—and enduring protection.

To get the complete details on savings and durability, check with your Polyken representative or call the Polyken Tape Coating Distributor nearest you. Or simply write Polyken, 309 West Jackson Blvd., Chicago 6, Ill.

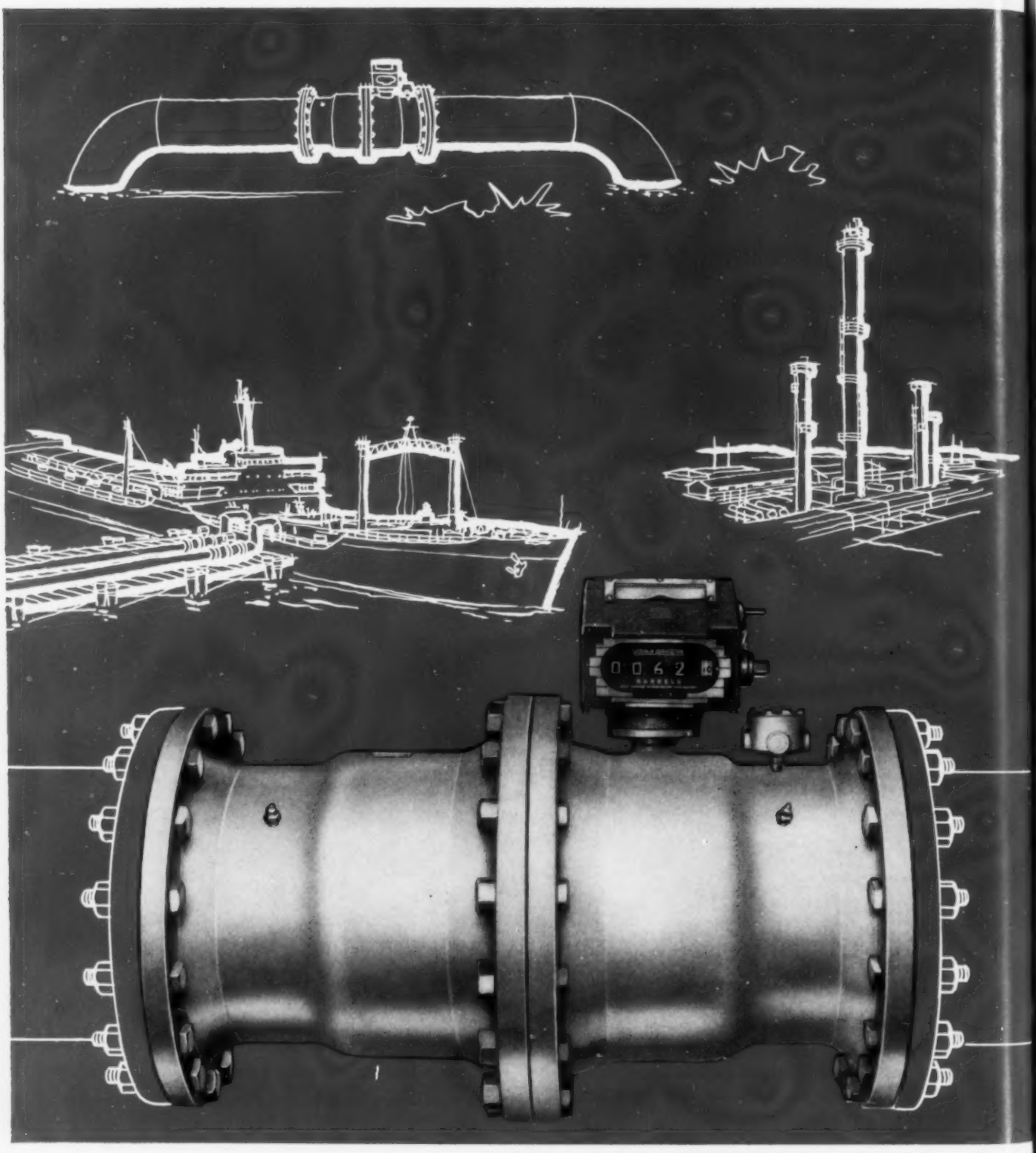
THE MODERN WAY

Polyken®

EXPERIENCED IN PROTECTIVE COATINGS

THE KENDALL COMPANY
Polyken Sales Division

LET YOUR METER



Accurately Measures Everything from Crude Oil to Finished Products without Manual Attention

NEW ROCKWELL

For Pipeline Control, Barge

DO YOUR THINKING

when viscosities change!

Automatic Correction For Viscosities

In this exclusive design a token amount of filtered line fluid is bled to a compensator which corrects measurement by applying a varying resistance on the turbine rotor directly proportional to the viscosity of the product being measured.

Low Drag, Air Foil Rotor

Measurement is accomplished by a low drag, air foil turbine rotor which revolves quietly on ball bearings. With it higher rates of flow are possible—up to 15,000 bbls per hr. in the 16 inch size—as much as 50 per cent greater than comparable size positive displacement meters and with accuracy, repeatability and reliability unmatched in any other design. These characteristics have been proved by testing against positive volumetric and gravimetric standards.

Compact and Lightweight

The Turbo-meter is no larger in diameter than pipe size. Its length is less than three pipe diameters. Compared to other meters it weighs much less.

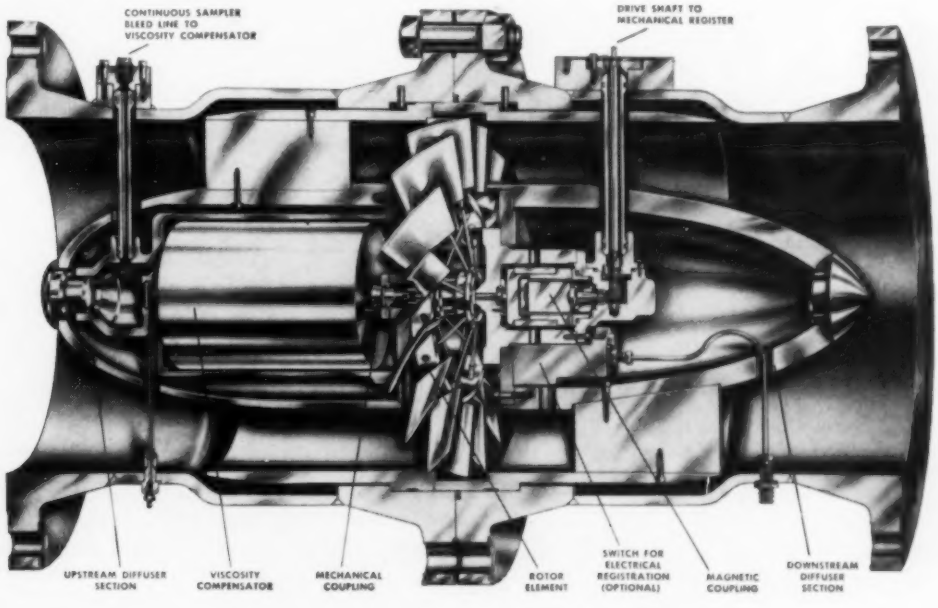
Longer Life—Lower Maintenance

Due to the light weight of internal parts which turn freely on enclosed, lubricated bearings, extended life is assured, and uniformity of meter factor is accomplished. Head loss is negligible. Maintenance is minimized and alignment is flexible.

What Does It Cost?

You can buy these improved design meters for less than *half the cost* of comparable sized displacement meters. You'll save, too, on shipping, installation and servicing. Write today for bulletin OG-417, Rockwell Manufacturing Company, Pittsburgh 8, Pa. In Canada: Rockwell Manufacturing Company of Canada, Limited, Guelph, Ontario.

TURBO-METERS
another fine product by
ROCKWELL



TURBO-METER

Loading, Custody Transfer

NEW help-saving International®

speeds "stringer-bead" and "hot-pass" welding

—for C. S. LeNoir Construction Co., Austin, Texas

Laying a 30-inch line for Trunkline Gas Co., C. S. LeNoir Construction Co., Austin, Texas, speeds stringer-bead and hot-pass welding operations—with two new International TD-15 Paywelders.

"New TD-15 Paywelders are giving all-around faster operation with less manpower and equipment than previous truck and skid-welder operation," states Pipe Foreman R. J. Bernard. "And the equipment is more efficient."

The new, compact, high-output Paywelder is the only factory-designed tractor-powered-and-mounted welding unit—for dependability and long life!

This 325 amp unit teams with the new 6-cylinder TD-15 crawler equipped to produce 120 int. hp. Unit consists of two Lincoln dual welders—with four welding leads. Reach-easy control panels are at operator's right and left. Positive sealing protects unit from dirt and moisture. Front pto driven by V-belt.

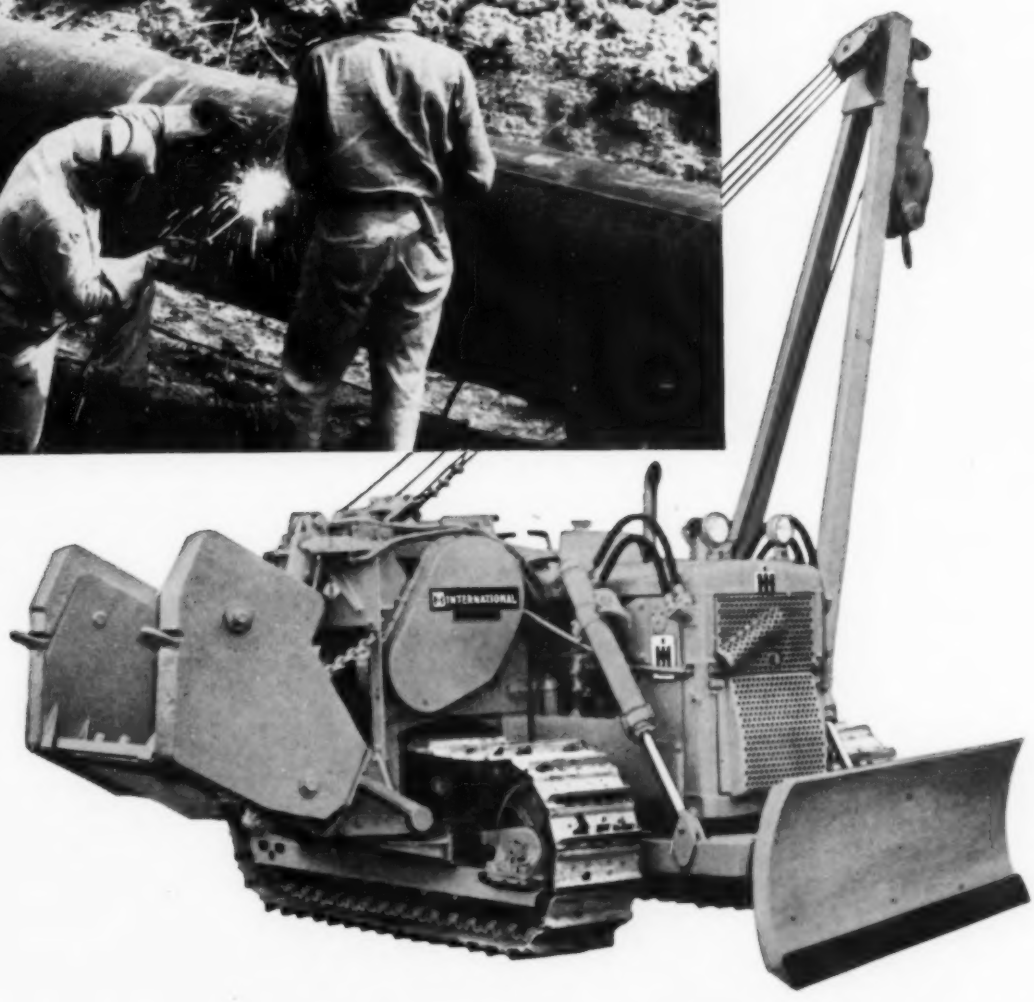
Self-contained and self-propelled, this spread-speeding, go-anywhere unit is balanced to operate on all terrain. For maximum flotation on swampy right-of-way, use maximum width track shoes. Engine hp matches load requirements for top performance and economy.

See your International Construction Equipment Distributor—see how the new 6-cylinder, TD-15 Paywelder, and new sideboom can step up your money-making capacity. Measure advantages like dual-protected Dura-Rollers—International's 1,000-hr. lube interval track rollers, specially-developed to meet pipelining conditions. Compare the TD-15's 6-speed, full-reverse transmission; Shuttle-Bar forward-reverse control; dry-type sintered metal faced engine clutch, to anything else on tracks. Ask for a demonstration!

TD-15 PAY®WELDER!

One engine "generates" and "transports"—and sure-treading tracks take the Paywelder where it's needed and when! And 120 int. hp are "on tap" to pour out the 325 amps—to help you speed stringer-bead and hot-pass welding! The new Paywelder is the only completely factory-designed-and-mounted crawler welder!

New bottom-hinged hydraulic counterweight International Superior SBI-150-BH sideboom lifts 46,500 lbs. at 4'. Carried and powered by the new 105-hp, 6-cylinder TD-15 crawler. This easy-to-haul, fast-stepper lowers-in pipe as big as 24"—strings 36" pipe—does pipeline utility and maintenance work with stand-out speed and economy. Add the hydraulic blade backfiller attachment (shown)—and get a backfilling machine for a small fraction of a complete dozer outfit's cost!



International Harvester Co.
180 N. Michigan Ave., Chicago 1, Ill.

A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors . . . Self-Propelled Scrapers and Bottom-Dump Wagons . . . Crawler and Rubber-Tired Loaders . . . Off-Highway Haulers . . . Diesel and Carbureted Engines . . . Motor Trucks . . . Farm Tractors and Equipment.

International® Construction Equipment

WHY PEDRICK'S

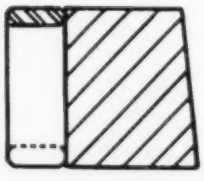
Conformable TAPER-FACE COMPRESSION RING

GIVES MAXIMUM PERFORMANCE IN BIG-BORE ENGINES

Recommended especially for 4-cycle engines.

Big reason is unusual conformability of this Pedick design under every sort of cylinder condition. This important advantage is the result of Pedrick's exclusive "Equalizer" steel expander ring that exerts a uniform pressure all around the cast-iron cylinder contacting ring. The cast-iron section is radially thinner, much more flexible.

The taper-face of this conformable compression ring initially provides a line contact with the cylinder wall. You benefit from higher unit pressure, quicker seating and sealing, less chance of scuffing the cylinder wall.



TF7 DESIGN
U.S. Patent No. 2,771,329

The TF7 design shown here is one of the many *specialized* designs developed by Pedrick to provide users with the best combination of rings for maximum results in each installation. The right ring in the right place is your best guarantee of long-lived, dependable, low-cost operation. You're invited to call on our Engineering and Consulting Service to help you solve your particular ring problems. Write, wire or phone: WILKENING MANUFACTURING Co., Philadelphia 42, Pa., Tel.: SAratoga 9-3770. *Canadian readers:* Wilkening Manufacturing Co. (Canada) Ltd., Toronto 2.

Pedrick PISTON RINGS

PEDRICK PIONEERED *conformable* RINGS FOR BIG-BORE ENGINES

Communications by Stromberg-Carlson:

SYSTEM-WIDE DIALING FOR THE PIPELINE INDUSTRY

available on lease

The pace of today's business requires immediate communication all along the line. Complete, system-wide dialing of voice or data is the logical answer.

Stromberg-Carlson can supply **all** your needs with telephone and switching equipment designed by one of America's oldest telephone manufacturing companies and use-tested from coast to coast.

XY® Dial switching systems: standard of the independent telephone industry for quality and reliability.

Four-wire data and telephone switching systems: for vastly improved transmission and economy.

Voice and telegraph carrier: rugged, economical, easy to install and maintain.

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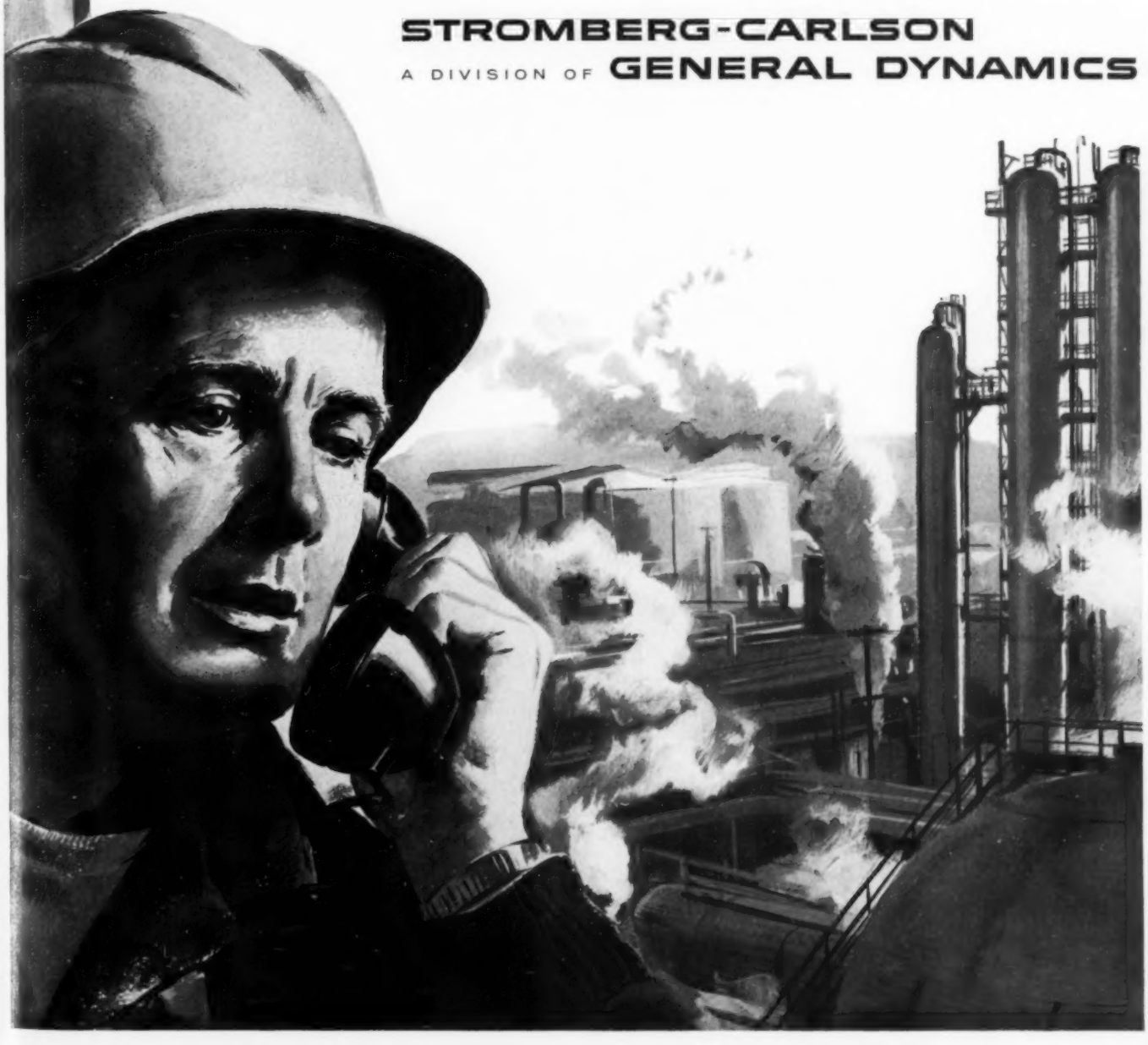
Telephones: high-efficiency desk and wall instruments of exceptional ruggedness and reliability.

Complete details on our equipment lines and lease plan are available on request. Write to Telecommunication Industrial Sales, 127 Carlson Road, Rochester 3, New York.

STROMBERG-CARLSON
A DIVISION OF **GENERAL DYNAMICS**



Superior quality 12¾" O.D. J&L Electricweld line pipe was used for 17 miles of this Northern Oklahoma Gas Company line from Cherokee to Ponca City. The line will serve the towns of Ponca City, Perry and Newkirk, Oklahoma, and area industries. J&L line pipe is available in sizes from 6⅝" to 12¾".

General Contractor:
O. R. Burden Construction Corporation, Tulsa, Oklahoma
Contractor for coating and wrapping:
Secrest Pipe Coating Service, Tulsa, Oklahoma

Pipe laying operations with this J&L Electricweld line pipe are fast and efficient. Weldability is excellent. Pipe is 29.28 pounds per foot, .219" wall, X-46 grade.

Reliable field performance is assured because every length of J&L pipe undergoes a specified hydrostatic pressure test which proves its dependability under sustained and surge pressures.

This ultrasonic tester provides immediate pictures of weld soundness in all J&L Electricweld line pipe. It is one of the most advanced control devices in pipe-making.

Quality control at J&L pays off on a job at Cherokee

Every length of J&L line pipe passes over 50 quality tests before it enters the field

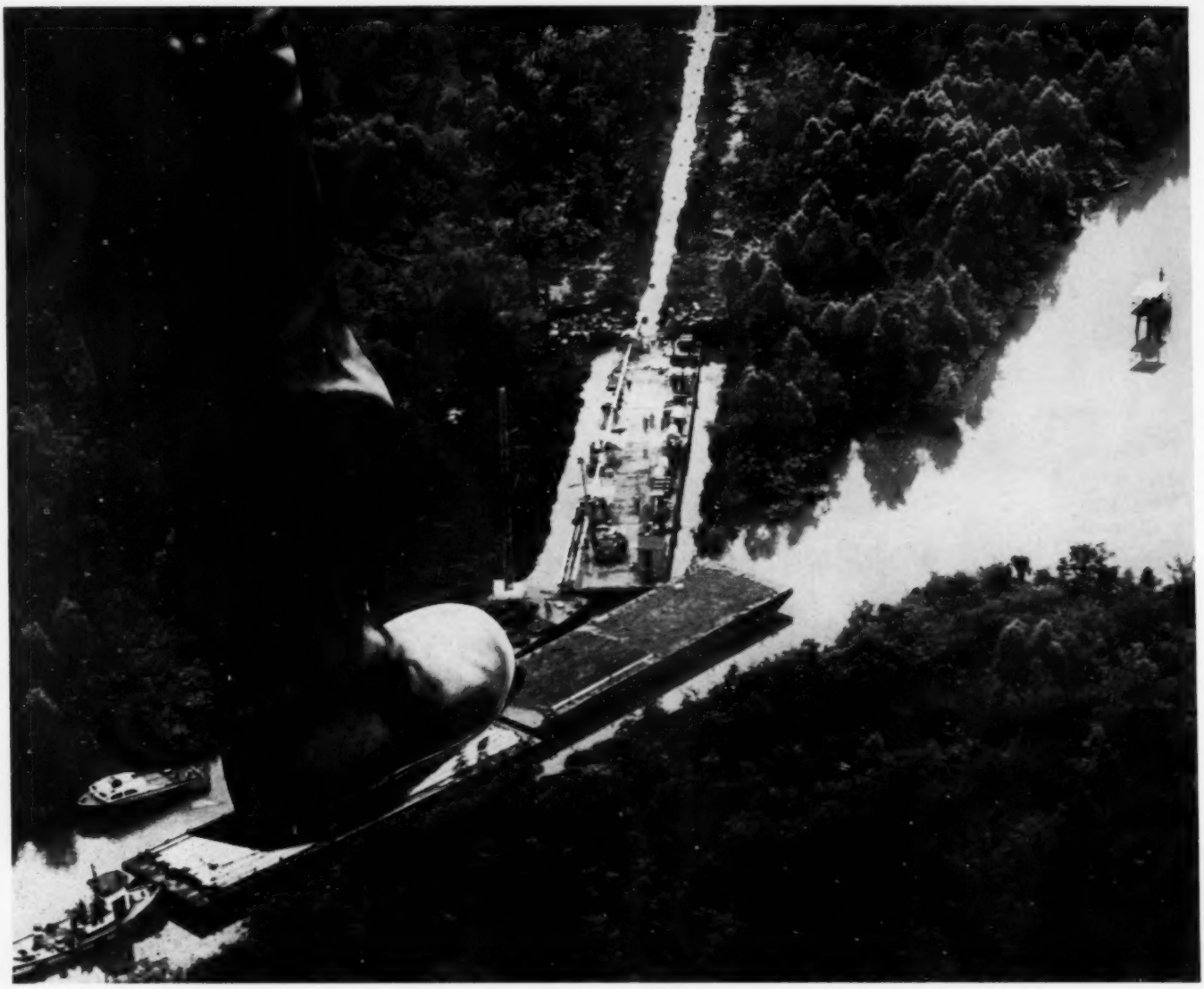
Total quality control of J&L Electricweld line pipe is maintained through more than 50 control measures and tests on every length of pipe.

Crush tests assure weld strength and steel quality. A modern ultrasonic device probes soundness of the weld. All joint ends are magnafluxed to assure freedom from flaws. Every length is full-pressure tested under specified A.P.I. or A.S.T.M. hydrostatic test requirements, both in time and degree of pressure. These are a few of the stringent controls that assure complete dependability of J&L Electricweld line pipe.

It pays to specify plant-tested, field-proved J&L Electricweld pipe for your transmission, distribution or gathering lines. Write for J&L's new bulletin.

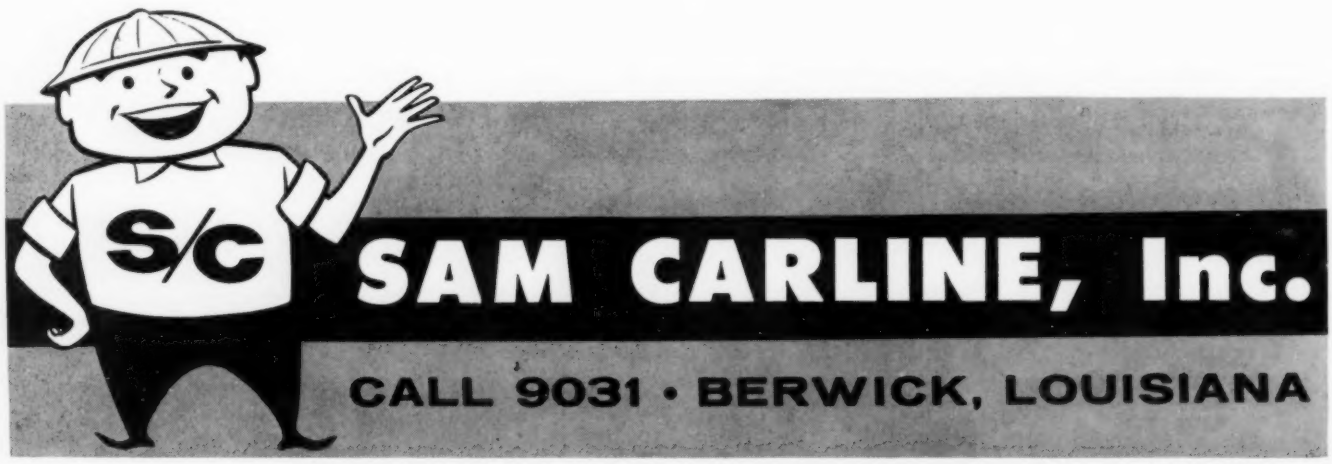
Jones & Laughlin Steel Corporation

PITTSBURGH, PENNSYLVANIA



The Biggest Boots in the Industry

Sam Carline, Inc. lay barges support the biggest boots in the pipeline industry, boots of men trained to do the biggest jobs and do them quickly and efficiently. Big Boots take over when a Carline lay barge comes on the scene, as it did in the 10,000-foot, 8-inch line of United Gas, pictured near Berwick in August. Big Boots have given Carline a solid network of achievement in the Deep South.



PIPE LINE PANORAMA

How Colorado Interstate Made Money Pigging Condensate from Sags . . .

Problem: Colorado Interstate's 40-mile, 16 to 24 inch gas gathering system extended over Oklahoma's rolling countryside in numerous arches and bends. Large quantities of rich condensate were collecting in the sags, creating such high pressure build-ups at wellheads that safety discs were in danger of rupturing.

Solution: Automatic spheroid launchers and receivers—special spheroid plug valve—slug catcher consisting of two sections of 34-inch line, 900 feet long.

Results: More than 1 million gallons of gasoline was recovered in first 10 weeks —system's efficiency increased enough to eliminate need for compressors.

Court Decision Boon to Texas Pipe Lines . . . In mid-January, Texas Supreme Court ruled that state-federal funds must be used to cover multi-million-dollar pipe line relocation costs incurred during interstate road work. Highway officials have tried long and hard to charge costs to pipe line companies.

Crude Pipe Line Mileage Growth Slows Down . . . BuMines reports only 1,400 miles (less than 1 percent) increase in net crude and products pipe line mileage during past three years. New record total of 190,000 miles reflects addition of 25,500 miles of new and second hand pipe during this period, while more than 24,000 miles of old pipe was taken up.

However, pipe line fill increased more than 5 percent to 82.3 million barrels, pointing up trend to use of larger size pipe.

New Labor Law Clarified . . . In recent speech, National Labor Relations Board Associate Solicitor Saul Jaffe pointed out that despite arguments of some union officials to the contrary:

- Congress did not intend to modify or overrule Mountain-Pacific doctrine, and therefore did not intend to legalize exclusive hiring halls which did not meet Mountain-Pacific standards.
- Although new law allows contracts that require employes to become union members 7 days after they are hired, present 30-day period remains in effect until Pipe Line Contractors Association and unions negotiate change.

Pipe Line Panorama . . . Chairman Jerome K. Kuykendall reports Federal Power Commission's staggering pile of pending natural gas producer rate cases climbed to 3,065 on December 31, compared with 2,034 on same date in 1958; only 240 cases were settled in all of 1959 . . . **Meanwhile, path to natural gas decontrol bill continues to be blocked with political inaction,** particularly in light of unexpected omission of Administration support in President's budget message (See Editorial, **Page 4**) . . . **Look for U.S. coal proponents to put up stiff battle** against Canadian gas export prices, claiming they will hurt U.S. coal sales . . . **Proposed $338 million Alberta, Canada-California pipe line project** got big boost late last month when Alberta Government authorized an increase from 2.3 to 4.2 trillion cubic feet the volume of gas that can be exported from the Province over 25-year period . . . **FPC is expected to give quick green light** to Michigan-Wisconsin Pipe Line's proposal to up its natural gas transmission facilities 175 MMcf per day; Cost: $51.2 million.

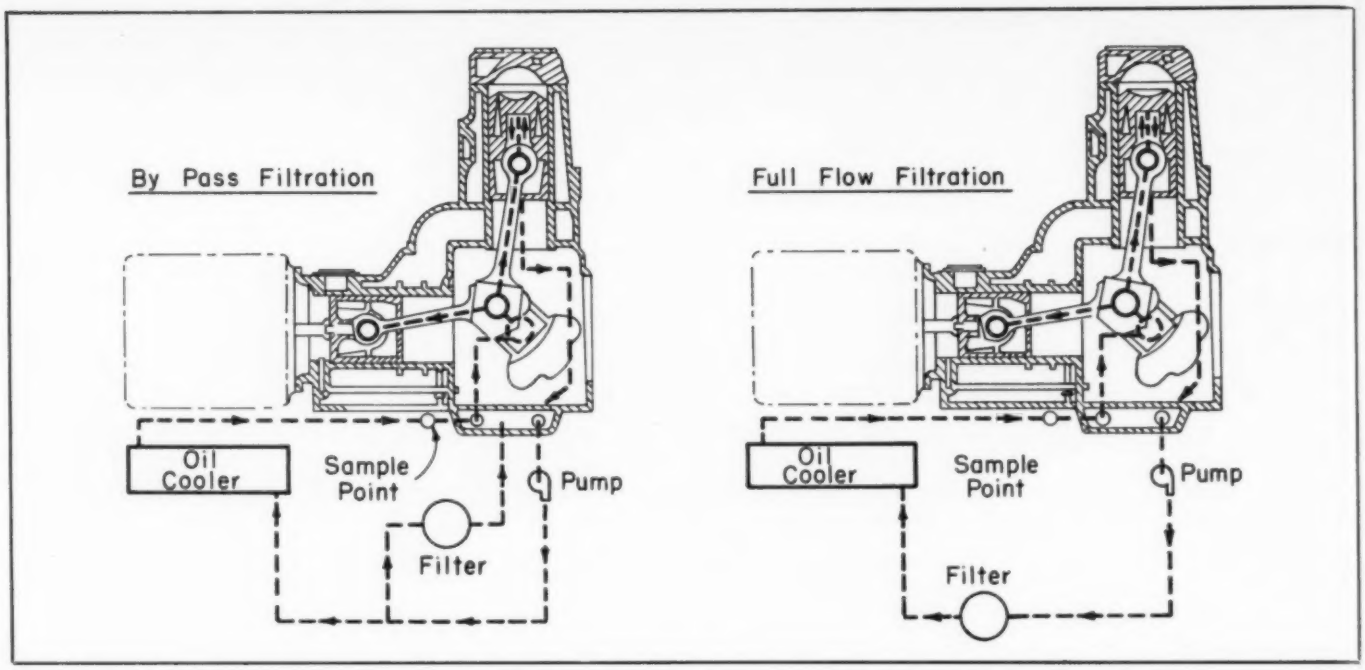


FIGURE 1—Sampling points for engines employing bypass filtering and full flow filtering. Note, that the sample is taken after the oil has been exposed to every possible source of contamination: Mobil Oil Company takes samples every four months, and when three basic tests show troubles, more detailed tests are run.

What Lube Oil Analysis Can Tell You About Engines

Here's a practical tool for preventive engine maintenance. Many engine ills can be diagnosed before they become troublesome through lube oil analysis

By W. E. Scruggs, Mechanical Engineer
Mobil Oil Company, Dallas

PREVENTIVE MAINTENANCE is the watchword for successful engine operation. By diagnosing troubles before they actually occur, repair bills and down time can be kept to a minimum.

What is the key to preventive maintenance? Diagnosing troubles ahead of time. There are a number of signs and indicators which foretell engine troubles quite accurately. One of the most effective—but little used—is lube oil analysis. Many engine ailments first show up here. Here's the way it works:

Theory of Lube Oil Analysis Program. Lube oils are very complex compounds; they may contain several thousand different types of molecules. Many of these molecules are known as *unsaturates;* that is, the molecular structure is incomplete or very unstable. This type of molecule frequently changes its form completely when stabilized under heat and/or pressure. This new molecular form may be a *varnish, gum* or *resin.*

In addition, oxidation of the oil takes place under certain conditions resulting in the formation of free carbon. During this oxidation hydrogen is liberated which, in turn, combines with other compounds to form *fatty acids.* None of these new forms are lubricants and the fatty acids readily attack equipment parts.

Apart from the internal changes of the lubricating oils, contamination from foreign materials such as water, dirt, blowby gases, excess fuels and metal particles worn from the equipment may render the oil useless or unsafe for lubrication. Today's lube oils, however, are built to resist or tolerate most of these contaminants, and rarely is the lube oil the cause of engine failure. Rather it is conditions in the engine that cause the lube oil to fail.

In other words, when tests show the lube oil to be failing it only points to something wrong in the engine causing it to fail. Thus, the theory "keep a check on the lube oil to keep a check on the engine."

This is exactly what the Natural Gas Department of Mobil Oil Company (formerly Magnolia Petroleum Company) has been doing since initiating its lube oil analysis program some nine years ago. We believe it has

LUBRICATING OIL DATA SHEET

DATE: _____

FOR MONTHS OF _____

SUBJECT: LUBE OIL SAMPLE SHIPMENT

Following is data on lubricating oil samples shipped this date from _____ Gasoline Plant to the Natural Gasoline Laboratory for Testing:

Sample Number			1	2	3	4				
Sample From Engine No.			E-1	E-2	T-2	T-3				
Date Sample Taken			9-9-59	9-9-59	9-9-59	9-9-59				
Type Engine			GMV-10	GMV-10	G.E. Turbine	G.E. Turbine				
Type Oil			M-4D	M-4D	T-MH	T-MT				
Tests to be Made			Std.	Std.	Std.	Std.				
Operating Hours Since Oil Change			10,013	6,000	56,000	59,000				
Engine Temperature, °F	Water Jacket	In	140	160						
		Out	150	170						
	Lub.-Oil	In	130	155	140	144				
		Out	130	165	147	154				
Type Filter	Filter Material		-Cotton & Rayon -		Paper	Paper				
	Manufacturer		Hilco	Hilco	Hilco	Hilco				
Date Filter Changed			6-11-59	6-11-59	6-11-59	6-11-59				
Place Where Sample Taken			Oil Return Line	Oil Return Line	Sump	Sump				
Remarks										

The above samples were taken by _____

Yours very truly,

_____

FIGURE 2—This Lubricating Oil Data Sheet follows oil samples through the laboratory and right up to the analysis which follows.

been a very practical program and is becoming more valuable as we become more experienced with it.

Lube Oil Sampling. One of the most important steps of lube oil analysis is *taking of the sample*. Test results can be no better than the sample taken. To be true a sample must properly represent the flow of oil being furnished the engine or turbine. In Figure 1 two typical large horsepower engine lubrication systems are shown. One system employs full flow filtration; the other system uses bypass type filtration. As can be seen, the point of sampling is on the oil return line to the engine. Everything that has been done to the oil, including possible contamination from an outside source will be reflected in a sample of oil taken here.

Certain pertinent data are also taken at the time of sampling. A sample data sheet is shown in Figure 2. This data sheet accompanies the oil sample to the laboratory and later it is used when test results are interpreted.

At the present time an oil sample is taken from all of the company's engines and steam turbines every four months. The sample schedule is staggered so that a given number of samples reach the laboratory for analysis each month.

Tests Run On The Lube Oil Sample. Figure 3 shows a Lubricating Oil Result Sheet. All of these tests are standard ASTM or Federal Stock Catalog designated tests.

Experience has shown that the tests on *viscosity, water (percent by weight)*, and *neutralization number* are the best indicators for engine crankcase oils. When something is wrong with an engine these test values change quicker, and at a greater rate than any of the other values tested. Normally, these three tests are all that are run on samples of engine crankcase oils and the three make up what is called a standard test. Such a test is shown under Field Sample No. 2. However, should any of the results of the standard test exceed approved limits, a more complete test is run in order that more information is available for evaluating the oil and for determining the cause of its failure. This complete test is shown in Field Sample No. 1.

The same practice has proved successful in tests run on turbine oils; the most useful tests on turbine oils being water percent by weight and neutralization number. These two comprise the standard test for turbine oils. The standard test for turbines is shown under Field Sample No. 4. The complete test is shown under Field Sample No. 3.

Considerable money is saved through running only the shortened tests. The intra-company laboratory charge for a complete test is $41. The charge for a standard test for

LUBRICATING OIL RESULT SHEET

DATE: _____

SUBJECT: RESULTS OF LUBE OIL TESTS ON SAMPLES TAKEN AT _____

Date Sampled:
Date Received at Lab:
Date Tests Completed:

	TEST RESULTS								
Field Sample Number	1	2	3	4					
Source	#1 Engine	#2 Engine	#2 Turbine	#3 Turbine					
Laboratory Number	L-4108	L-4109	L-4110	L-4111					
Type Oil	M-4D	M-4D	T-MH	T-MH					
Insoluble in Chloroform	0.08		0.02						
Insoluble in Pet. Ether	0.12		0.05						
Ash, % by Wt.	0.50		0.00						
Water, % by Wt.	1.2	Nil	0.2	Nil					
Viscosity at 210° F., SSU	67.5	62.0	55.4						
Neutralization Number	1.5	Less 0.6	0.4	0.1					
Rust									
S. N. Number									

FIGURE 3—Lubricating Oil Result Sheet. The test of Field Sample No. 2 is standard and its cost is approximately $15. The more complete test shown under Field Sample No. 1 costs $41. The complete test of turbine oil, Field Sample No. 3 runs the same; but the standard test for turbine oil, Field Sample No. 4 runs only $10.

engine crankcase oil is $15. The charge for a standard test for turbine oil is $10. In most cases these and other lube oil tests are furnished as a free service by the supplier to his customers.

Significance of Tests. The complete test run on oil samples is shown in an accompanying table but because the standard tests have been the more important ones let us look at their significance.

Viscosity (ASTM Designation D-88-56). This test is a measure of the oil's resistance to flow due to internal friction. It has often been termed the most important single property of a lubricating oil.

This property is important due to the inherent design of the engine or turbine where viscosity is depended on to give a certain "body" to the oil for proper bearing lubrication; also, the viscosity is important in maintaining certain oil flow rates for proper cooling of bearings, pistons and other parts.

An increasing viscosity is most probably caused by oxidation of the oil due to excess heat from hot bearings, blowby of hot gases, excessive operating temperatures and related conditions. A decreasing viscosity, which is rarely ever found in natural gas fueled engines indicates dilution from an outside source.

Water, Percent by Weight (ASTM Designation D95-56T). This is a measure of the water content of the lube oil. Water content should always be "nil". A trace or more of water is cause for immediate action. One source of water is from combustion of the fuel; the water either condensing on relatively cool cylinder walls and being washed and wiped by the piston rings into the crankcase or by blowby of the water vapor with other blowby gases into the crankcase. Low jacket water temperature aids in condensation of the water vapor on cylinder walls. Low lube oil temperatures combined with bad crankcase ventillation help in condensing water vapor in the crankcase. Another source of water is leaks in oil coolers and cooling water jackets.

Neutralization Number (ASTM Designation D974-55T). Neutralization Number is a measure of the acidity of the oil. Since the advent of additive treated oils, the significance of this test has become greatly complicated and has been the subject of many controversies. An oil may test acidic when new thereby making the absolute values of this test of little importance; however, when the neutralization number of the original oil is compared with the neutralization number of the used oil the test has some significance. Even here there is a considerable difference of opinion as to what effect an increasing neutralization number has in relation to corrosion of acid sensitive metals.

In using this test, we interpret an increasing neutralization number as an indication that excess oxidation is taking place in the oil and that the cause of the oxidation should be found and eliminated.

Recording of Test Results. It was found that the plotting of the test results gave a more complete picture of just what was going on than would just a set of tabled values.

Figure 4 shows a set of plotted test results. Normally only standard test values are plotted. To make the plotting more meaningful all test results are plotted against thousand hours operation on the oil. Also added for engines, is a plot of the lube oil consumption because lube oil consumption (hence lube oil makeup) has a direct relation to lube oil test results.

Results of Lube Oil Analysis Program. The primary result of the program has been a savings in engine crankcase and turbine oil changes.

Prior to the lube oil analysis program our maintenance people were faced with the problem of when to change oil in certain units. They were not willing to take a chance with costly equipment, and more often than not, changed the oil *just to be safe*. Now they are no longer faced with this problem. If oil in an engine or turbine is questionable they simply have a sample analyzed for $10, $15, or $41. Then they know whether they should change the oil or not. Considering the fact that some engine lubricating systems hold approximately $250 worth of oil, the economics of this is easily seen.

The real value of this program however has been the aid it has given to our maintenance people in their preventive maintenance program.

Taking and analyzing an oil sample from an engine is like feeling the pulse of a human being. The pulse of a human being is a direct indication of the condition of that human being. The results of an oil sample analysis also is a direct indication of the condition of the engine.

Case Histories. To see this better, let us look at some lube oil test results where these results have been used in indicating troubles with engine and turbines.

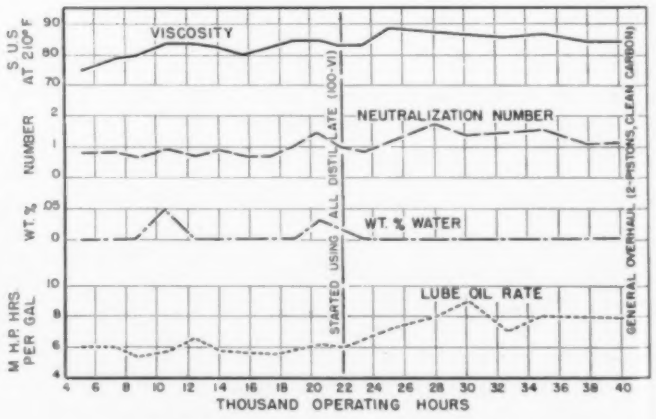


FIGURE 4—Lube Oil Test Results.

1 Shown in Figure 4 is a plot of the lube oil analysis test results from a two-cycle natural gas engine. This engine has been in service for almost five years with no major repairs needed. The fact that this engine was in

good condition over this period is reflected in the test results. One thing that is significant is that at two times in this five year period test results showed the oil to contain some water. The water, caused by low lube oil temperature, attributed to a faulty temperature control allowing the engine jacket water temperature to run too low, was quickly eliminated. There were no damaging effects to the engine. Had the water remained in the lube oil considerable damage could have been done to the engine.

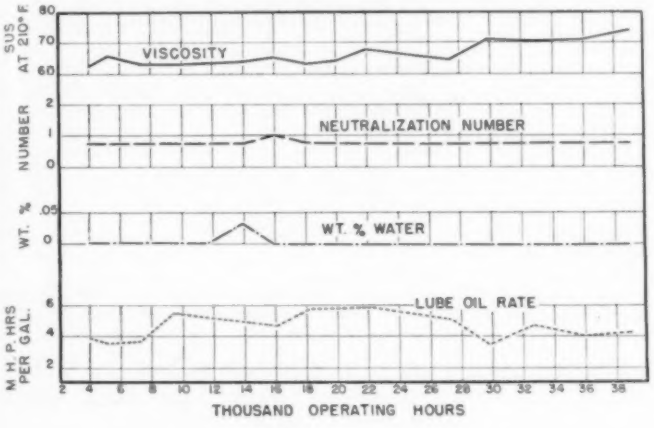


FIGURE 5—Lube Oil Test Results.

2 The lube oil analysis test results for a four cycle natural gas engine is plotted in Figure 5. This engine also has had approximately a five year life with no major repairs. After approximately 13,000 hours of operation water was found in the lube oil. The temperature was raised on the engine jacket water system along with adding extra crankcase breathers. As can be seen, the water was not present on the next test.

Note the gradual increase in oil viscosity and the increase in oil consumption after 30,000 hours of operation. This is probably caused by wear of the piston rings and of course could be substantiated by running compression tests, checking for blowby, etc.

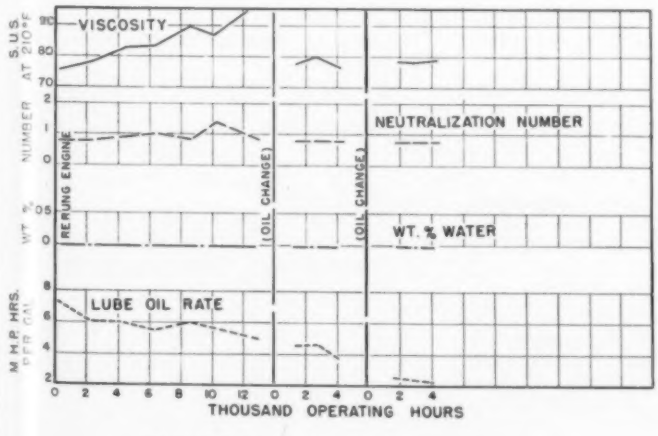


FIGURE 6—Lube Oil Test Results.

3 Shown in Figure 6 is a plot of the lube oil analysis test results from an engine after an overhaul. The viscosity of the oil increased very rapidly indicating oxidation and contamination of the lube oil. The oil consumption also increased very rapidly. The oil was changed in this engine twice and adjustments and minor repairs were made to the engine. Actually, the cause of the trouble was a set of piston rings that never did seal, and once blowby started in the engine the rings stuck and the condition gradually became worse.

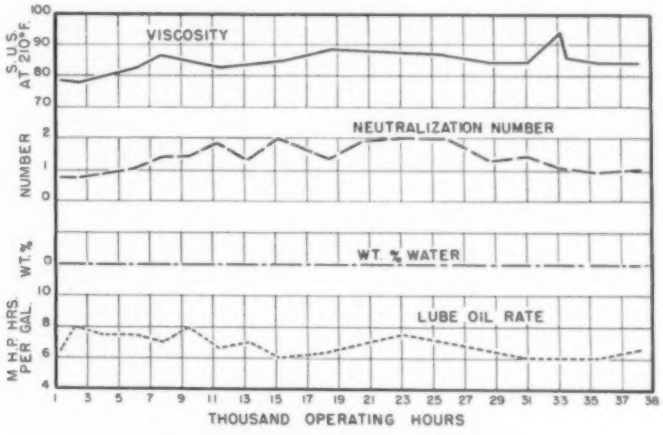


FIGURE 7—Lube Oil Test Results.

4 Figure 7 shows a prime example of bad lube oil sampling. After about 33,000 hours of operation the lube oil analysis test results showed a marked increase in viscosity of the oil indicating something wrong with the engine. A check sample of oil was taken on the engine and the engine thoroughly checked over. No troubles were found with the engine and the analysis of the check sample showed the oil to be in good condition.

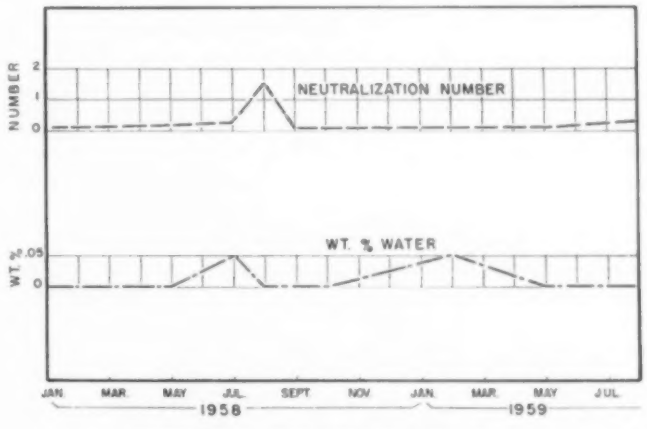


FIGURE 8—Lube Oil Test Results.

5 The lube oil analysis test results for a large steam turbine is shown in Figure 8. There are three identical turbines at this installation. The first increase in water and the resulting increase in neutralization number shown for this turbine was also present in the test results made for the other two turbines. The trouble was traced to a malfunctioning oil reclaimer which serves

HOW TO INTERPRET RESULTS OF LUBE OIL TESTS

Test	Significance	Tests Indicate These Possible Causes of Engine Trouble
Viscosity (ASTM Designation D-88-56)	This is a measure of the resistance of the oil to flow due to internal friction. This is probably the most important single property of the oil. The viscosity of the oil should be kept within the limits recommended by the manufacturer.	An increase in viscosity is usually caused by oxidation of the oil or by contamination of the oil by the products of combustion. Possible Causes: 1. Engine oil temperature too high. 2. Engine jacket water temperature too high. 3. Blow-by from stuck or worn rings. 4. Fuel mixture too rich, causing excessive firing temperatures. A decrease in viscosity is a rare occurrence in natural gas fueled engines, but would indicate dilution.
Water, Percent Weight (ASTM Designation D-95-56T)	This is an actual measure of the water contamination of the oil. Water content of the oil should always be nil. Water increases the viscosity of the oil and if allowed to stay in the oil, will cause sludge formations. Any water content in the oil calls for immediate investigation.	Two possible sources of water are: 1. Products of combustion. 2. Water leaks. Possible Causes: 1. Low jacket water temperatures, allowing condensation of water on cylinder walls. 2. Low lube oil temperature, allowing water to condense in the oil. 3. Excessive blow-by past piston rings. 4. Bad crankcase ventilation. 5. Water leaks in oil coolers and (or) engine water jackets. 6. Steam seal leakage on steam turbines. 7. Malfunctioning oil reclaimer on steam turbine.
Neutralization Number (ASTM Designation D-974-55T)	This test is a measure of the acidity of the oil. A high test value may indicate corrosion ability of the oil. However, this should only be relied upon to indicate if oxidation or contamination of the oil is taking place. Fullers earth filters can be used on mineral oils to control neutralization number.	Possible Causes: 1. Engine oil temperature too high. 2. Engine water temperature too high. 3. Blow-by from stuck or worn rings. 4. Fuel mixture too rich, causing excessive firing temperature.
Ash, Percent Weight (ASTM Designation D-482-46)	This test is an indication on contamination with dust, dirt, etc. of straight mineral oils only. Results of the test may be too complicated to indicate detergent loss or contamination. However, it may give an indication of engine wear.	Possible Causes: 1. Dirty or ineffective air filter 2. Ineffective oil filtration. 3. Excessive wear of engine parts.
Percent Insoluble in Petroleum Ether (Fed. Stock Cat. No. 311.1.1)	This is a measure of the total insolubles such as dust, dirt, gums, tars, etc.	Possible Causes: 1. Dirty or ineffective air filter. 2. Ineffective oil filtration. 3. Excessive wear of engine parts. 4. Engine condition bad in general (see causes listed in other tests)
Insoluble in Chloroform (Fed. Stock Cat. No. 311.1.1)	This is a measure of the insolubles that are contaminates. This test is run on the insolubles found in petroleum ether.	Possible Causes: 1. Dirty or ineffective air filter. 2. Ineffective oil filtration. 3. Excessive wear of engine parts.
Insoluble Difference	The difference between the values of the insolubles in petroleum ether and in chloroform is a measure of the resins formed in the oil by oxidation and (or) thermal cracking.	

all three turbines. The second increase in water was present only in this particular turbine. The cause of the trouble in this instance was a ruptured steam seal allowing steam to enter the oil.

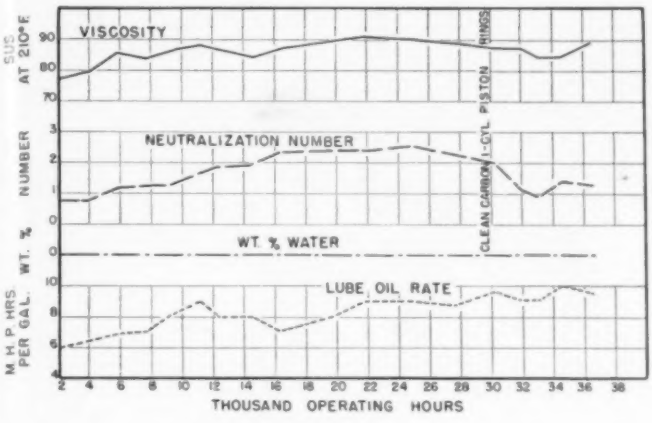


FIGURE 9—Lube Oil Test Results.

6 Figure 9 shows a plot for a two cycle engine. Notice how the lube oil consumption rate curve tends to follow the oil viscosity curve. This appears to be true in all cases when the piston rings, or at least the oil control rings, are operating properly. Also it can be seen here the effect the condition of the engine had on the lube oil both before and after the repairs were made.

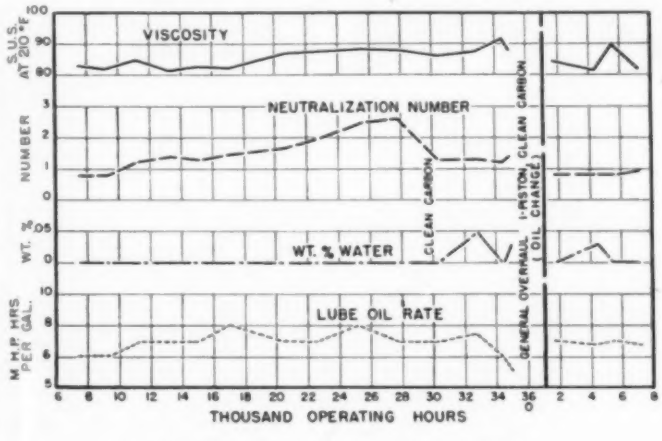


FIGURE 10—Lube Oil Test Results.

7 Figure 10 presents the best example of how lube oil analysis has given information to our maintenance people. Looking at the plot of the lube oil analysis test results for this two-cycle engine conditions were normal until about 22,000 operating hours. At this time the viscosity of the oil started rising slowly. The neutralization number took a sharp increase. On checking the engine the scavenging air ports were found badly plugged with carbon. Notice the abrupt drop of the neutralization number of the oil after the port cleaning; however, there was apparently still something wrong with the engine as the oil now contained water and soon the viscosity started going up again.

The engine was then taken off the line for general overhaul. One cracked piston was replaced and the oil was changed. Now the engine should have been in good condition. Apparently this was not true because water was present in the new oil even though the engine was completely overhauled. The last test shows the engine to be in good condition.

From this, it is apparent that lube oil analysis does not pinpoint troubles but when it is used in conjunction with other signs and indicators it is a great aid in finding conditions before costly damage occurs the equipment.

Special Maintenance Problems. Lube oil analysis is not confined as a tool for routine maintenance only; but it is also applicable to special maintenance problems.

We have run field tests on various makes and models of lube oil filters by sampling and analyzing the inlet and outlet streams to and from the filters. Also, the best methods of lube oil filter hookup may be determined by the use of lube oil analysis. A list here could be quite long, the only prerequisite to using lube oil analysis as a criterion being that the equipment to be tested, through its success or failure, has such an effect on the lube oil that this effect may be recognized in an analysis of the lube oil.

Limitations of Lube Oil Analysis Program. As much help as our lube oil program has been to our maintenance people it has not solved all maintenance problems. There are, we have to admit, some limitations to our program. For example we failed to pick up bearing wear in large reciprocating pumps having very high bearing load through regular sampling and analyzing the oil in the pump crankcase. There was no indication in the lube oil test results that the bearing was wearing out until it failed completely.

Problems such as this could probably be solved by the addition of spectrographic analysis to the program. The recent report made by the American Gas Association concerning spectrographic analysis of lube oils looks very good for problems such as this.

We feel that lube oil analysis has been a very practical tool in our preventive maintenance program and that in the future through better sampling, analyzing, record keeping and interpretation techniques maintenance people will be given better and more complete information on diagnosing engine troubles ahead of time.

ACKNOWLEDGMENT

Presented at NGAA, Panhandle-Plains Regional Meeting, Amarillo, Texas, Nov. 20, 1959.

About the Author

William E. Scruggs joined Magnolia Petroleum Company (now Mobil Oil Company) in 1952. He is a 1951 mechanical engineering graduate of Oklahoma State University. His various assignments with Mobil have included work in both gasoline plant and field operations of the Natural Gas Department. He has been in the Mechanical Engineering Maintenance section of the Natural Gas Department since 1957. He served two years in the U.S. Navy during World War II.

An inflatable rubber and fabric hose-like concrete form (left) is the key to this new patented process. The inflatable form shapes inside of the pipe. A concrete forming device (center) makes it possible to pour pipe in a continuous process. The rubber and fabric form is being inflated here. Right is concrete pipe poured by the new continuous process in a freshly cut ditch.

Machine Forms Pipe in the Ditch

Is the "pipe line machine" here at last? Nope. Not yet. This one lays continuous pipe but it's concrete!

A NEW "pipe line machine" that forms "instant" concrete pipe in a freshly cut ditch at the rate of 8 to 12 feet per minute is giving an amazing performance in the irrigation districts of Arizona. The technique was developed by Fullerform Continuous Pipe Corp., a Phoenix contractor. Inflatable rubber and fabric forms make the method possible.

Using two 300-foot inflated forms with only 3 pounds per square inch of air pressure, the contractor can pour as much as 600 feet of concrete pipe at a time without interruption. It is possible to line up forms for runs in miles. Ready-mix concrete trucks are used in a continuous stream to service the pouring equipment.

Developed over the past nine years, the construction process consists mainly of a double-hoppered forming machine that is pulled along the rounded bottom of a ditch, while enveloping an inflated inner form.

The inflatable "inner" form is picked up by the "outer" form so tamping devices can literally tuck concrete under it. Half of the double hopper, activated by electrically driven tampers, shoves concrete into the bottom of the ditch, while the other half is forming the top of the pipe.

The hose-like, inflatable form, constructed of two plies of cotton fabric coated with neoprene rubber at an aircraft plant near Phoenix, is open at both ends to hold airtight bulkheads through which air pressure is applied for strength.

The inflatable form is easy to handle and can be deflated for extraction about two hours after the concrete has been poured. This makes possible use of the same form several times a day.

As concrete is poured into the machine's double-hopper, the forming machine is drawn forward by a cable on a winch. An electric motor on top of the machine operates the tamping devices that distribute concrete uniformly and tightly around the inner form.

Fuller has developed inflatable forms in lengths from 50 to 300 feet and has laid pipe from 12 inches in diameter to 48 inches. He is now working on a machine and inflatable form to lay 60-inch pipe.

ACKNOWLEDGMENT

Photographs courtesy of Goodyear News Service, Goodyear Aircraft Corp., Phoenix.

The third overload relay can be installed to a standard motor starter in a matter of minutes. This additional relay may save the motor.

Answer to the Third Overload Relay Question

Three-phase overload protection for three-phase motors. This controversial third relay can now be added easily, quickly

By **R. A. Gerg**
Controls Department
Allis-Chalmers Mfg. Co.
Milwaukee, Wis.

WHILE TWO-PHASE overload protection is standard for three-phase motor starters, there has been considerable agitation to revise the codes to require a third overload relay on all low voltage motor starters. Numerous articles have discussed the pros and cons of this additional protection.

Some authors have been emphatic in their belief that the majority of motor controls should have three-relay overload protection, while others remain neutral but point out possible conditions that might require such protection. A third group feel that the additional relay involves a needless expense, since there are few occasions when three-relay overload protection is required.

As a result of this variance in opinion, the latest designs in motor starters have the standard two-phase protection with provision for an easy-to-install third overload relay. The relays can be installed in the field as easily as in the factory. Figure 1 shows how a third overload can be added to a standard starter.

Partially Protected Motor Is Vulnerable. The three-phase overload protection discussion involves a num-

One company reported 300 cases of motor burn-outs from single-phasing

ber of possible motor circuits in which two overload relays do not provide complete protection.

The most talked about situations in which two overload relays could prove inadequate involve motors fed from either delta-Y or Y-delta transformers having isolated neutrals. In this type of application the current in one phase of the motor could be as much as twice that in the other two phases if one primary line of the transformer is opened by fuse action or other cause. If the phase with the high current is not one of the two protected by standard overload protection, the motor phase winding will be damaged.

With the same transformer connection but with a delta or Y motor at standstill, the locked-rotor current in one phase through the motor control would be 100 percent normal three-phase locked-rotor current, while the other two-phase lines would carry only 50 percent normal three-phase locked-rotor current. With the high current in the unprotected line, the motor overloads would not operate fast enough to protect the motor.

Less commonly considered is another problem with the Y-delta and delta-Y transformers that results from unbalanced primary voltages. In this case a two percent over-voltage unbalance in one phase of the primary can result in a 15 percent overcurrent in one phase of the motor. Normal overload relays are selected for 125 percent full-load motor current trip. The additional 15 percent could mean 144 percent current in the one phase. Voltage unbalances of greater than two percent are quite common; with only two overload relays the high current may occur in the unprotected phase.

Single-Phasing Has Side Effects. Under certain load conditions, a small three-phase motor having two-relay overload protection and operating in parallel with a larger motor can also become a problem if one line of the power system supplying the motors is opened. The larger motor will supply power to the smaller motor, and one phase of the smaller motor will carry an overload while the other two lines will carry about normal or lower current. If the overloaded phase is unprotected with an overload relay, the motor will be damaged.

In a similar circuit, a single-phase load across two lines of a three-phase motor can cause a similar unbalance if the supply is single-phased. The unprotected line of the motor might be carrying an overcurrent with a two-relay-overload control, resulting in motor damage.

For complete motor protection three overload relays are generally specified when:

1. The motor is driving vital machines.
2. The motor is unattended.
3. Y-delta or delta-Y transformers supply the motor.
4. The transformer connections are not known.
5. Motors are operated in parallel with other motors or loads that might cause phase unbalance.
6. Local electrical codes require.

One company reported that within a one-year period there were 300 known cases of motor burn-outs on their system resulting from single-phasing. The same company reports that it suspects many additional unreported cases within the same period. Since the cost of the additional overload relay is usually less than two percent of the combined cost of a motor and starter, the addition may prove good insurance. Approximate increased costs are shown in Table 1.

Because of the pressure imposed in various areas to change both local and national electrical codes by requiring the additional relay, the ease of adding the relay becomes important. New motor starter designs make it easy to add the third overload relay. If the motor circuit arrangement is not clearly free of possible single-phasing or unbalance problems, it may be economical to take advantage of this versatility.

TABLE 1

Control Size	Motor HP at 440 Volts	List Price of Control	Motor List Price for 440 Volt 1800 RPM	Cost of Motor and Control	Cost of Heater and 3rd O.L. Factory Installed	Percent Extra Cost for 3rd O.L.
0	5	$ 39	$ 212	$ 251	$ 6	2.4
1	10	44	372	416	6	1.5
2	25	84	628	712	10	1.4
3	50	138	1122	1260	25	1.9
4	100	308	2190	2498	40	1.6
5	200	684	4514	5198	70	1.4

Approximate prices given for comparison only.

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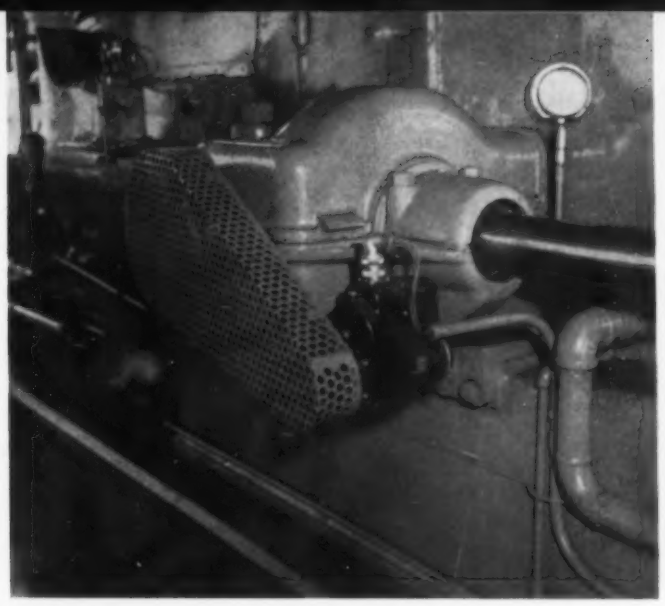
About the Author

R. A. Gerg was graduated from the University of Wisconsin in 1941 with a B.S. in electrical engineering. Shortly after graduation he entered the Allis-Chalmers graduate training course, and soon took a permanent assignment in the Control Department.

Today Gerg is an engineer in the department, responsible for a number of special development projects. He has written numerous articles and is an authority in motor control and protection.

Get More Mileage Out of Those Older Horizontals



Belt driven magneto, key component in Cities Service Gas Company's new ignition system in modernizing its horizontal engines.

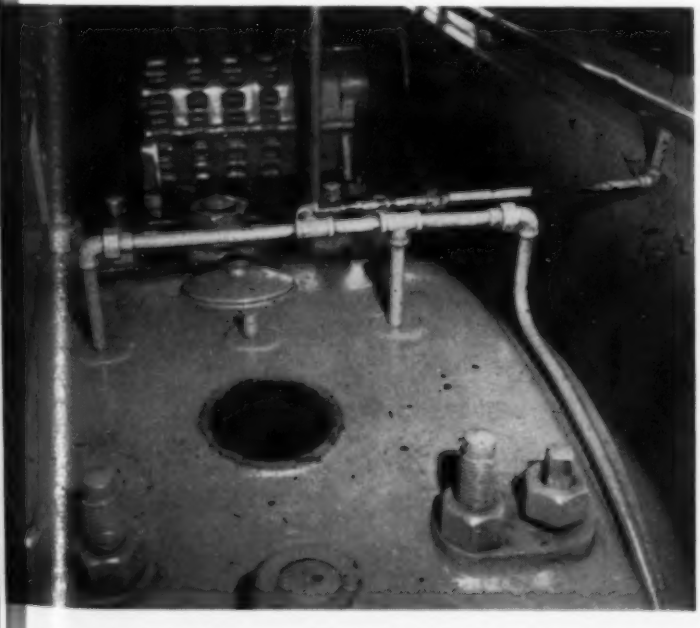
Cities Service Gas Company saves money by increasing efficiency of its senior engines

AS A RULE, gas companies are "stuck" with engines they buy for 25 years or more. And one of the tasks of the operating maintenance force is to get the most mileage out of equipment which has been installed. It is assumed by regulatory bodies governing the transportation of interstate gas, that the compressor equipment will be the most efficient available at the time of installation. And once installed, it takes considerable improvement in efficiency to warrant junking existing equipment in favor of new models.

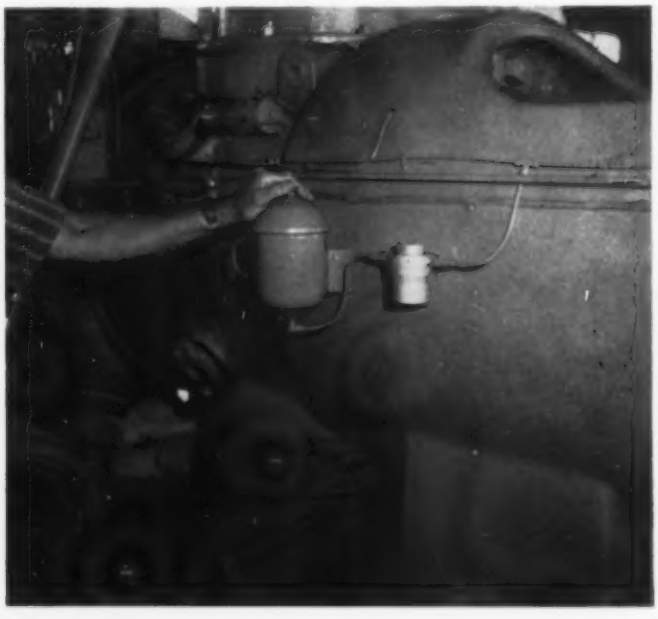
This means there's not much of a trick to operating highly efficient engines efficiently—the trick is to operate inefficient engines efficiently!

Cities Service Gas Company has made considerable progress along these lines. The company modernized its older horizontal, low speed engines, effecting substantial economies and greatly improving the efficiency of its pipe line system. Several engines were involved in the modification program —they are located at a number of compressor stations—some of them have been in service for nearly 50 years!

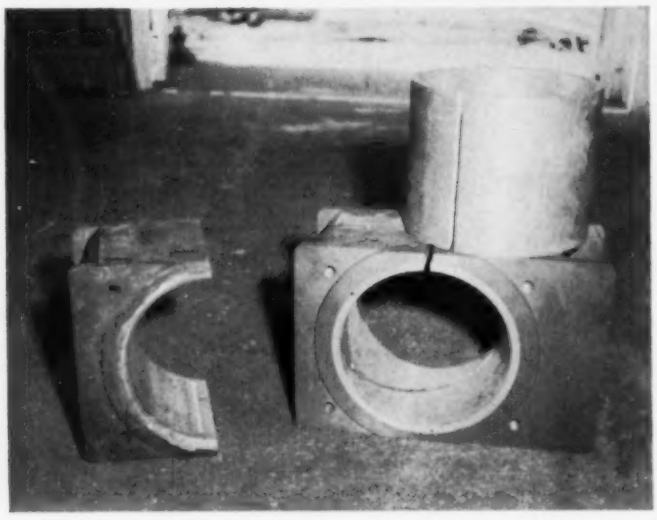
Revising the Ignition Systems. First step in the modernization program is to install low-tension magneto ignition sytsems, replacing the interrupter battery type systems. The magnetos used in the new system are similar to those furnished on the new vertical or angle type engines. The



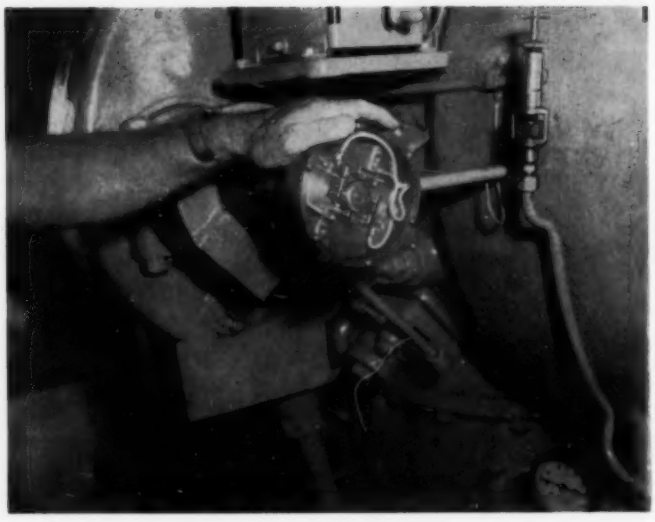
Pressurized oil lines carry lubricant through main bearing caps. This procedure improves oiling system on older horizontal engines.



Auxiliary filter and flow meter measures the oil pumped into the lubricators and increases efficiency of old-style horizontal engines.



Old style babbitt bearing (left) is being replaced by aluminum sleeve bearing in the Cities Service program for modernizing old style horizontal engines. An extra sleeve sits atop bearing shell.



Distributor controls current from magneto; part of program for modernizing ignition system of old horizontal engines.

magneto is driven with timing belt and sprockets which drive it in perfect synchronism with the engine at four times the engine speed.

This new ignition system has been installed on engines at Pampa, Higgins, Corwin, Wichita and Grabham stations; it has resulted in a more reliable ignition system, and better fuel economy.

Improving Lubrication. The second step was to improve the lubrication system. The horizontal engines installed at Hugoton and Greensburg stations have been equipped with pressure type oil filtering and lubricating systems which force oil under pressure to all important bearings. On the older horizontal engines, gravity type filters were used which were very inefficient, and the bearing lubrication was also gravity-fed.

Filtering. This system is being changed so that all of the oil is passed through a carton type filter which removes dirt and foreign particles larger than a few microns in size. To pressure lubricate the important bearings, the oil, after passing through the filter, is piped to the cross shaft back bearing where it enters that shaft and is conducted to the crank bearing. From the crank bearing, the oil is conducted to the main crosshead bearing through a tube attached to the connecting rod. Oil is also piped under pressure through the main bearing caps.

Pressurized Lubrication. A study of the lubricating system indicated that the forced-feed lubricators for the cylinder oil were not operating efficiently, partly due to entrained air in the lubricating oil. When a high viscosity fluid such as a lubricating oil is pumped into a container and then poured into a lubricator, air bubbles are introduced which stop the oil flow. This difficulty can be eliminated by use of the pressurized lubricating system.

New Uses for Old Carburetors. During the past several years, the same oil had been used for both the engine lubrication and cylinder lubrication. With this fact in mind, a float valve assembly from an automobile carburetor was installed on each lubricator to maintain a constant oil level, and to permit a small amount of oil to be introduced continuously at the top of the lubricator. The oil used for the lubricators was taken from the engine oil system through an auxiliary filter and a flow meter which measures the oil in gallons and tenths of gallons. Copper tubing connects the outlets of the flow meter to the various lubricators on the engine.

After installing this system on the cylinder lubricators, it was then necessary to provide a means of maintaining a constant supply of oil.

To do this, a float valve assembly was placed in the settling tanks and oil was piped from the main lube oil storage tanks with a meter placed in the line at each oil settling tank to measure the amount of oil added to each engine. Experience has shown that under the gravity type system it was necessary to drain and replace the engine oil periodically because there was a tendency for the oil to become acidic and unsuitable for use. However, under the new system, it is not necessary to change oil in the crankcase; it is filtered continously and new oil is added automatically.

Push-Button Engine Greasing. Another improvement in lubrication is being tested at Drumright and Pampa stations. A pressurized greasing system which forces lubricating oil or grease to the wearing areas of the base plates and to the bearing points on the inlet valve mechanisms has been installed on several engines. Cities Service is now experimenting with a hand-operated pump on this system.

As air pressure is admitted to the pump, lubricant under high pressure is forced into the tubing leading to all the points on the pressure system. Each of the outlet connections is a tiny valve which can discharge a given amount of oil per cycle. Likely a pump will be installed which will be capable of lubricating all of the points on two engines, and an electric timer which will make this system automatic throughout the engine room.

In addition to the changes in the lubricating system on the horizontal engines, the company plans to install

(Continued on Page 63)

The hoister rises from the sea with a list. This is caused by air entering the tanks unevenly.

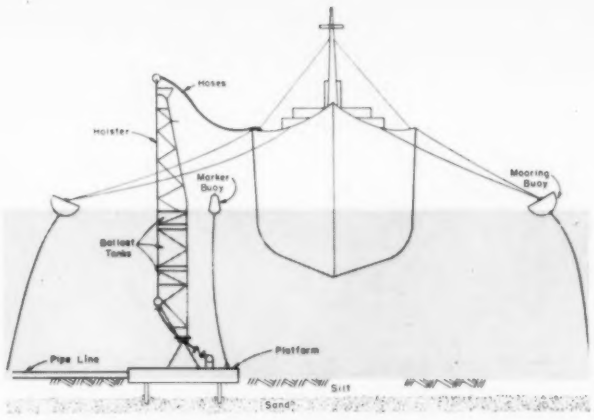
Tanker Loading Lines That Rise Out of the Sea

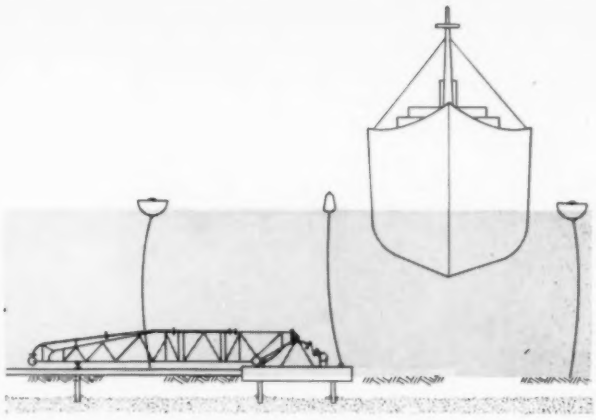
They are stored on a lattice frame—far below shipping and wave action—when not in use. Compressed air brings them to the surface when they are needed

By **R. C. Ledford,** Vice President
Collins Construction Company, Houston

A SUBMARINE HOISTER with ballast tanks patterned after those of a seagoing submarine is providing a working solution to the problem of storing offshore tanker loading hose. When not in use, the flexible lines are stored on the upper side of a hoister some 50 feet below the surface of the sea. When a tanker is ready for loading in the deep water mooring, she ties onto mooring buoys, blows compressed air into the ballast tanks mounted on the hinged structure. One end of the hoister then rises high into the air above the water bringing four 12-inch hose as shown in the illustrations.

In the past, most offshore pipe lines have terminated with long, large-diameter hose which simply rest in the mud on bottom between tankers. Damage is frequent when the hose are pulled out of the mud, and tangling is not uncommon. From the drawings it is obvious that tangling with the





How the hoister works . . .

Tanker comes into mooring (left), ties onto mooring buoys, then blows compressed air into ballast tanks on hoister. It rises to vertical position bringing loading and discharge hoses. Tanker is loaded quickly. At right, tanker is loaded, discontinues compressed air into ballast tanks. The hoister then sinks to the bottom, carrying the hose above a lattice-work frame, thus protecting them from the mud.

lines attached to the new hoister is unlikely. Too, the hose does not touch the mud on bottom.

Persian Gulf Sea-Loader. The first hoister of this kind was installed at the offshore end of a 24-inch line in the Persian Gulf for the Kuwait Oil Company, Ltd., at Mena-al-Ahmadi, Kuwait. The pipe line had been laid earlier, but because of the lack of loading facilities, it had never been used at maximum capacity originally. On January 28, 1959, thanks to the new loading device, the tanker, *British Courage,* was able to take on cargo at the rate of 3,560 tons per hour!

Background. As world traffic in petroleum and its products has increased, so has the size of sea-going tankers increased. Since World War II, when the largest of carriers did not exceed 125,000 barrels, tanker capacities have climbed first to 300,000, then to 500,000 barrels, and a few 725,000 barrel tankers have been launched.

While this reduced the cost-per-barrel for transportation, it also brought on the additional problems of harbor depth and mooring facilities. It was necessary to increase draft as well as length and breadth of these giant ships to make them stable.

Even though the number of these super-sized vessels is still small when compared with total of all vessels, the handwriting is on the wall: More large tankers are coming, and all marine departments of the major oil companies are faced with the problem of deepening waters around existing facilities, or extending facilities to deeper water in order to serve these new vessels.

In most cases, deepening water in and around existing facilities represents a tremendous capital investment, as well as expensive annual maintenance. The same holds true for the alternative of building extensions to existing piers or wharfs to carry lines to deep water.

As a result, most of the transporters resorted to sea loading lines where water depth was a restriction. They would lay a submarine pipe line offshore to suitable water depth, where mooring buoys would be installed, and there they would attach hoses of sufficient length, usually more than 200 feet to allow for movement of the tanker. The loading vessel could pick up a buoy or marker attached to the hose on the bottom, hoist it up to the ship, attach to the manifold and begin loading. This solution also had its drawbacks in that the diameter of the hose was limited to about 12 inches due to weight and stiffness and if sufficient hoses were attached to the submarine line to prevent pressure drop in the hoses from limiting the capacity of the line, they found themselves constantly faced with the necessity of untangling long lengths of hoses, or damaging hoses as a result of trying to lift them off of mud bottoms where they had buried themselves. Sand bottoms would cause abrasion and subsequent expensive replacement of hose sections where the current carried across the installation at fairly high speeds.

Such problems were being accepted as part of the cost of accomplishment when A. C. Hartley, former chief engineer of British Petroleum and a consultant, applied himself to the problem of furnishing a more satisfactory answer to these needs. Hartley has considerable experience in all types of marine problems and, in addition, has considerable knowledge of pipe lines. During World War II he was responsible for the Allied Forces "Operation PLUTO," which was the manufacture and installation of 17 pipe lines under the English Channel to furnish gasoline for forces invading the mainland. In 1956 Hartley developed and built the first working model of the hoister shown here, and conducted experimental tests with it in a bathtub at his home. Encouraged as a result of these tests, Hartley persuaded John Brown (Clydebank) Ltd., to build an accurately scaled model and to conduct exhaustive tests in the same ship experimental tank in which his company had tested scale models of the *Queen Mary* and the *Queen Elizabeth.*

These tests of the hoister showed the reaction of ship hull and the hoister to various wave heights, pitch and directions. The final report indicated that the hoister would be able

o be operated in worse weather conditions than the tanker they were oading.

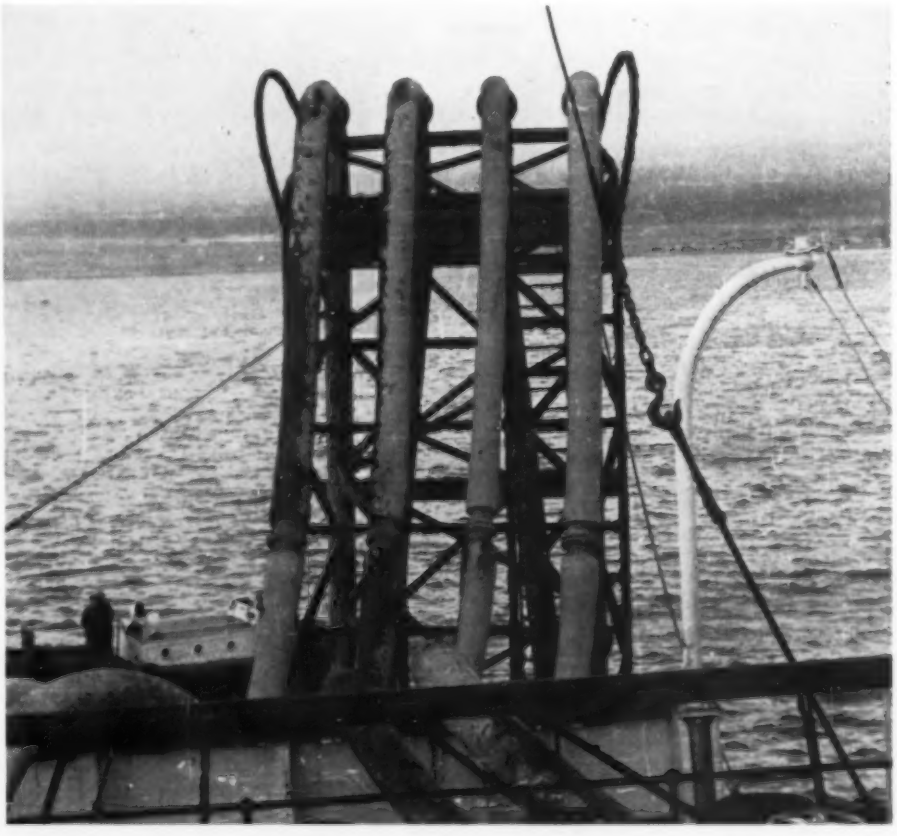
How the Hoister Works. The principle on which the hoister was designed resembles that of a submarine. A framework structure, which supports the loading hoses, surrounds the three ballast tanks, designed to furnish sufficient buoyancy when filled with air to lift the entire frame to the surface. Because the lower end of the hoister is secured to the bottom by means of a flexible chain connection to steel piling or other suitable anchor driven into the sea bottom, this buoyancy manifests itself as a lever arm to raise the superstructure out of the water, and at the same time leaves the ballast tanks below the low water line so that sea action can exert its force only on the open latticework of the frame itself. Further, to minimize the amount of surface exposed to wave action, the structural members of the frame are made of pipe, using the principal members as conductors for the oil to eliminate as much hose as possible.

Raising and Lowering. To simplify the raising and lowering and to eliminate any working parts, the ballast tanks have no valving. Instead, water is displaced from the top with air which forces the water out through drain pipes in the bottom. Air pressure is maintained on the tanks to keep the water displaced and to maintain buoyancy. To lower the hoister, air pressure on the tanks is simply released. This allows the water to refill from the bottom. The inflow of water is restricted by the water vent line size, to prevent abrupt rising or sinking. Oil hose connections at the bottom of the hoister allow sufficient flexibility in the submarine line connections so that no stress can be placed on either the line or the hoister by its movements.

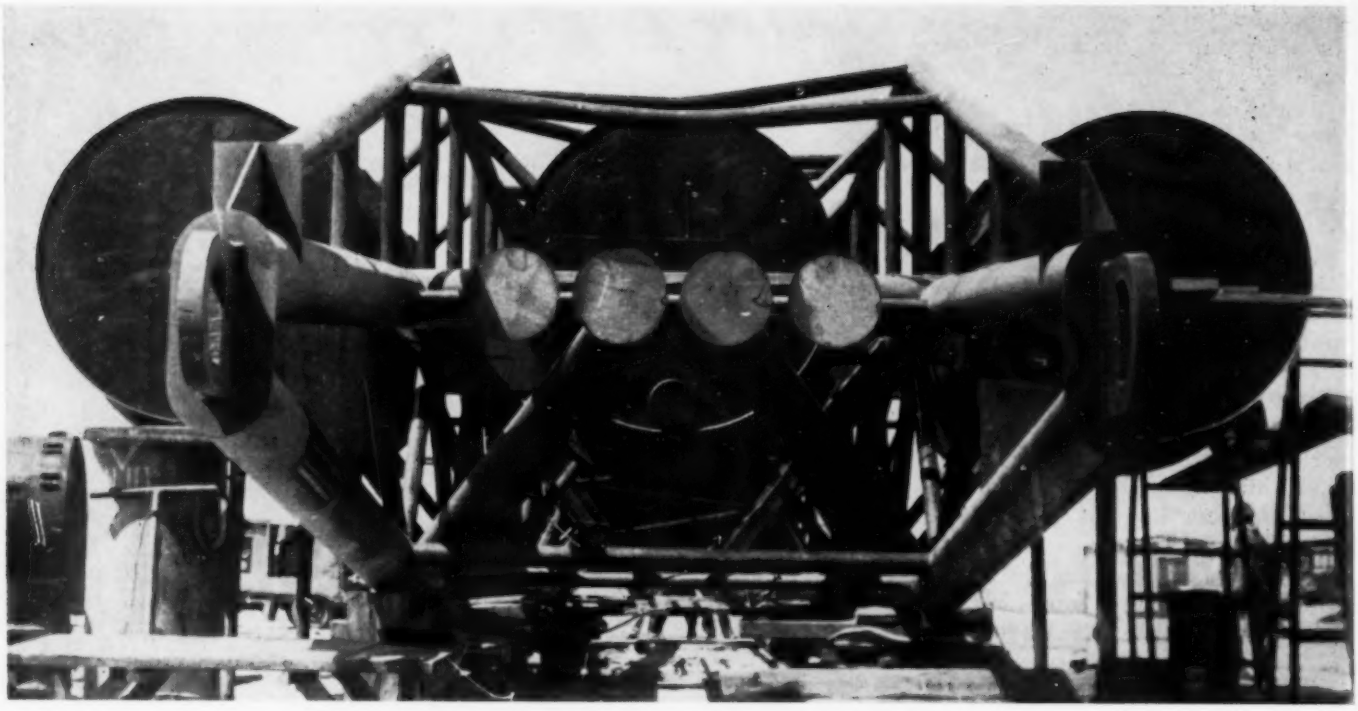
Sea Loading Benefits. In addition, the new loader has following advantages:

1. It can be quickly raised or lowered from the ocean floor.
2. It is undisturbed by current or heavy seas when on the bottom.
3. A sufficient number of hoses can be installed upon it to prevent excess pressure loss. There is no chance of tangling.
4. The length of hoses required could

In the Persian Gulf off Kuwait, the hoister supports four 12-inch tanker loading lines. This device can be raised or lowered in a matter of minutes with compressed air.



Hoister as seen from shipboard. The tanker British Courage loaded 3,560 tons of crude per hour with this new loading equipment.



Lower end of hoister shows hinges and ballast tanks. This device is supported by a heavy steel foundation. Advantages of the hoister are that mud hose is never tangled and never buried in the mud.

be reduced about 66 percent.

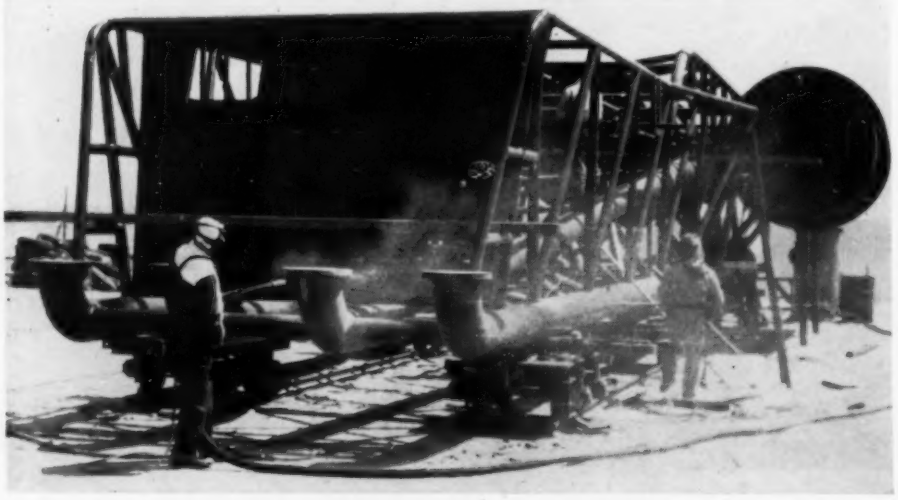
5. The hoister automatically adjusts position for rise and fall of tide, for position of tanker and for height of manifold due to loading and unloading.

First Sea Installation. After having determined the hoister's usefulness by tank tests, the first full-scale prototype was installed for crude and bunkers in the Persian Gulf. The initial loading rate of 3,560 tons per hour, represented an increase of 33 percent on the previous maximum rate for Kuwait Oil Company's 24-inch line.

The hoister can be designed for loading or discharging crude tankers at any desired rate in virtually any depth of water; and also for loading and off-loading any number of products through separate hoses for each product.

As can be seen in the diagrams, not only can the device be used as a separate installation, but by extending the submarine line from existing wharfs or piers, it can be used as an adjunct to existing facilities to increase capacities at a very reasonable cost.

A number of installations are planned for the near future, and scores of locations lend themselves to installations, as has been indicated by the interest of producers and shippers around the world.



Upper end of the hoister. Note that pipe is used instead of hose on the underside.

About the Author

R. C. Ledford has some 28 years experience in the petroleum industry. After studying mechanical engineering at the Missouri School of Mines, he became a design engineer for Phillips Petroleum Co. During World War II he was construction superintendent of one of the first high octane gasoline plants for the Defense Plant Corporation. Later he became chief engineer of Barber Asphalt Co., then construction superintendent for the McCarthy Chemical Co. In 1950, as chief engineer for the Marine Gathering Co., he designed and supervised construction of the first offshore pipe line laid in the Gulf of Mexico. He became vice president of Commonwealth Oil Co. when this company absorbed Marine Gathering. Ledford is now vice president of Collins Construction Co.

The Fine Art of Human Relations

You can buy a man's time. You can buy a man's physical presence in a given place. But you cannot buy initiative—you cannot buy loyalty—you cannot buy enthusiasm. These have to be earned

By Stephen G. Henry, Manager of Community Relations
Ethyl Corporation, Baton Rouge, La.

TECHNICAL ADVANCES, undreamed of a generation ago, have reshaped the face of United States business during the past 20 years. Yet, almost unrecognized while it was taking place, an even more important change has occurred—a discovery unrelated to the wonders of jet propulsion, electronics, or nuclear energy. It can be summed up very simply: American industry has discovered its employes. It has learned that people literally are the most important asset of any company. And it has begun to realize just how much of its valuable human potential still remains untapped.

The Carnegie Institute of Technology recently completed a research study, lasting more than two years, on business and industry. According to this study, 13 percent of man's business success depends upon his technical knowledge, while 87 percent of his success is due to his skill in human relationships and his ability to lead and get along with people. This skill is the most basic specification for executive attainment and leadership today and opens the gateway to greater human understanding for every businessman, no matter what his particular post in management might be.

It is essential, then, that those who direct the work of others not only have a broad knowledge of the facts and principles of psychology, but that they also be able to analyze work situations in terms of the human factors involved.

Working With People. Management must create a climate in which people will want to produce — a climate in which there is a will-to-work, as there is a will-to-win in sports. Now, to direct your thinking toward what we're going to discuss in working with people, let's look at what some leaders have said about this job of management—of handling people in a pipe line company, or in a plant, or in any business.

John Ruskin said, "Industrial leaders must keep ever before them these two duties: the making of goods, and the making of men."

Let's look next at the first man to make a billion dollars in the petroleum business. John D. Rockefeller, Sr., said, "Good management consists in showing average people how to do the work of superior people."

Charles Schwab, the first man to be paid $1 million a year (and that was before income taxes, when it was all take-home pay), said that his most precious personal asset was his capacity to arouse enthusiasm among his men because, as he put it, "inspired men have accomplished the impossible. Men saturated with lethargy soon sink into oblivion."

Andrew Carnegie, the steel master, stated, "If you took away my plants, my customers, my capital, in fact my whole physical set-up, but left me my management team, I could re-establish myself in a matter of a few years."

Clarence Francis of General Foods

said, "You can buy a man's time. You can buy a man's physical presence in a given place. You can even buy a measured number of skilled muscular motions per hour or day. But you cannot buy enthusiasm—you cannot buy initiative—you cannot buy loyalty—you cannot buy the devotion of hearts, minds and souls. You have to earn those things."

Yes, we can time-study a man's job, we can give him methods by which he is to do it; but we cannot buy his enthusiasm, we cannot buy his initiative, we cannot buy his loyalty, we cannot buy the devotion of his heart, mind and soul. We have to earn those things.

Dollars Not Enough. So often, these days, we are turning to the psychiatrist for our personal problems. Let's bring the couch into management's office. Here's what Dr. William Menninger of the Menninger Foundation of Topeka, Kansas, says: "Dollars, in any form —salaries, pensions, profit-sharing— are not what people really want most . . . constantly we must remind ourselves that in the final analysis, one simply cannot purchase sincerity, devotion, dedication or loyalty. The most important job satisfaction depends on each having the chance to develop the kind of relationship with his associates that will result in mutual respect and confidence."

The ability to work with and lead people is important. It involves all the "intangibles" of human relations —the motivations, feelings, sentiments, and satisfactions of people. The question of how to best develop this skill or ability is one of the basic problems of management today in its relations to the total economy.

While assembly line techniques have contributed greatly to increases in production and wage payments, they have failed notably in creating satisfaction for the worker, either in his job or in his life outside the factory or office. We know with great certainty how a machine will act under given conditions, but we are not always sure what to expect of the man who operates that machine.

Louis J. Lundborg of the Bank of America said, "With all the progress in engineering and the physical sciences, the human factor is still the most important. The further we go in automation, and the faster we go in developing machines to take the place of people, the more important people become."

Too often we fail to make work human. Management must be made aware of the need of workers to "belong"; to know about company plans, objectives, methods, and accomplishments; to achieve dignity on the job, and pride in their skills; to be recognized as persons, not as numbers. Repetitive tasks will be made meaningful only when men know what they are doing and why.

Now, then, we are saying there must be some job satisfaction, there must be a sense of belonging, there must be that tremendously important item of emotional "take-home" pay. Let's look a little further.

What's In A Name? Let's examine the problem as the Harvard Business School does in its case history methods. Let's look at some typical examples. Dad is at home now, after a day's work. Little Johnny crawls up in his lap and says, "Dad, just what do you do out at the plant?"

Suppose Dad is truthful, and hasn't been there too long—hasn't much seniority nor progressed very far up the promotion ladder. Suppose he tells Johnny, "I'm a third-class helper," "I'm a second-class painter," or "I'm a second-class pipefitter." His work is necessary, and important, in anybody's plant. But, there's not much to be proud of in the name of his particular job, is there?

The name by which we call a man's job and the way we refer to his work are tremendously important. And, with just a little ingenuity, we can do something about it without much cost.

The Hiring of Tony. Let's see how one plant solves this problem. Let's see what goes on at the plant cited by students of productivity as having the highest productivity rate in America, The Lincoln Electric Co. You go to work at The Lincoln Electric Co. by invitation only. You're not hired—you're invited to join the force there! Lincoln hires a little Italian by the name of Tony as what, in other plants, would be a janitor.

Tony is brought in on his first day of work, he is oriented and briefed on what the plant produces, on the importance of these products, and on the people who help make them. He's taken out by his foreman and shown his area of responsibility. Just then, carefully timed, what happens? Mr. Lincoln, the head of that business, during his walk through the plant, stops by and is introduced to Tony.

After the introduction, Mr. Lincoln says to Tony, "I'm glad to know that you are in charge of this area for housekeeping."

Can't you just see Tony, with a broom in one hand and a mop in the other, radiating job satisfaction? That night when he goes home to his wife and the little Tonys, what does he say? "I have worked for Lincoln only one day, and I'm already in charge of an area." He leaves off the housekeeping part of it. He's "in charge of an area."

Pride of Job. Isn't his employer going to get far more work out of that particular man, far more enthusiasm out of him—more loyalty and devotion to the job? Isn't Tony really going to take charge of that area, and tell his fellow workers: "Don't you throw it there. I'll have to pick it up!"

Tony's foreman could have taken him on a tour of his particular area of responsibility, and told him in detail exactly how, and in what order to perform each specific task. Tony would have done as he was told. But, he would have worked me-

chanically. He would have worked without initiative, pride or emotional satisfaction. He would have done exactly what he was told in such detail to do—and no more.

Valuable Lesson. Let's go next to a company in New York City that employs some 7,000 girls. Absenteeism was a major problem. A number of supervisors were trained to interview absentees at home to find out why they were absent. One morning, Jane didn't show up for work. About 10 o'clock a supervisor climbed up to Jane's efficiency apartment, knocked on the door, and was admitted.

The supervisor and Jane exchanged a few pleasantries, and then she asked, "Why did you stay at home today?"

Jane answered, "The problem is simple; I live with my sister who had an unfortunate marriage; there is a baby here; the baby sitter didn't come today."

"Why in the world didn't the baby's mother stay to baby sit?" the supervisor wanted to know.

The girl straightened up and said, "Why, my sister has an important job in a broker's office on Wall Street! If she doesn't go to work, the work piles up and she has to do it the next day. Her job is important. But with you, you have 300 girls in a pool to take my place. It's strange to me that you miss me at all, and that you are out here to see why I didn't come to work."

Think how the absence rate of those girls could have been reduced if that company had used some of the principles of human relations to give their jobs more meaning.

Not long ago, I was talking to the personnel director for the largest oil company in Canada. He said they had had a terrible time getting charwomen in their Toronto general offices. What did he do? He changed the name of the jobs. He changed it to office cleaning ladies. It worked. It solved the problem, not only of getting cleaning ladies, but of getting good ones!

Needed: "Humanation." The president of Stardrill-Keystone Co. does not believe that automation alone will solve our economic problems. He believes that productivity per manhour will not rise fast enough to take care of our expanding need unless it is accompanied by "Humanation." He defines "humanation" as the "full release of human creativeness of the working and managing forces, voluntarily cooperating with each other . . . through organized programs of joint participation in the productive process."

In other words, as Roger Hull of Mutual Life Insurance Co., says: "In the final analysis work is accomplished not by systems, rules, or procedures, but by people. People must be properly motivated if we are to have them draw upon the real wellsprings of their capacities. The greatest and most efficient procedure is one that will inspire people to do the best job of which they are capable."

The emotional security of the worker is no less important than his economic security—and business leadership has to foster both. A sense of security through the feeling of making an important contribution, plus the feeling that the opportunity to contribute will continue, is the truly human feeling of security.

To be a happy, efficient, safe worker, the individual must be given social status and function in the plant community. He must have a sense of purpose, feeling that through his job he is making a contribution to society. He must understand that he is part of an organization which is serving society and furnishing the goods or services that society wants and needs. He must be shown the relationship of his job to the work of the whole organization.

Top to Bottom. At this point some of you may be saying, "I'm not so sure that this philosophy is necessary at the bottom of the totem pole." Do you really think that? Well, I suggest you look up at the top of the pole—the totem pole of management. What do we see up there? Executive vice presidents, senior vice presidents, first vice presidents—and several other kinds of vice presidents.

Isn't it a fact that if you put a few more letters on an office door, and maybe a little wall-to-wall carpeting on the floor, you get more work—and perhaps at the same pay—out of that top man? This is very definitely working today. When any one of the presidents or general managers of a company goes down to the local bank to do business, does he want to do business with the office boy? No, sir. There's a vice president, or maybe the executive vice president for the pipe line account.

Now, if it works at the top of this totem pole, let's make it work all the way down the pole by recognizing people's pride in a job with a dignified name. It is tremendously important, I want to assure you. However, it's hard to change. Under some union contracts, changing the name or title of an existing job is often all but impossible, but you may want to establish other jobs sometime. When you do, make an effort to put names on those jobs that give them dignity and status so that you don't have "second class anybodies," or "third class anybodies" in your plant.

The "Dog" Shift Incident. Let's go back to the first man who was paid a million dollars a year to work for another man. Let's go with Charlie Schwab when he was a superintendent in a steel mill. Let's go out with him on the "dog" shift. And what is Charlie Schwab doing? He's walking through the plant. That's something! He stops to talk to a man. He shows some interest in him. What does he talk about? Does he ask him how grandmother is doing, or how little Johnny is doing in school, or any of the other paternalistic things that we're supposed to talk about? No!

Charlie Schwab asks, "How many tons of steel have you poured tonight?"

And that man is proud. He says, "Mr. Schwab, we've poured eighteen!"

What does Charlie Schwab do? He pulls a chocolate bar out of his

pocket, and with it writes "18" on the sand floor, and goes off.

When the next shift came to work, the ever-present wiseacre in it asked, "What does that '18' mean?"

The fellow from the "dog" shift immediately answered, "That's how many tons of steel we poured tonight."

And the wiseacre said, "Oh, yeah!"

But what did that new shift do? They poured more steel than the "dog" shift! Charlie Schwab found out what they had done, so he took the "scores" off the floor and put them on the bulletin board, and we had competition.

Let's break down Charlie Schwab's action that night and see how tremendously important it was. First, he walked through the plant—tremendously important. Secondly, he spoke to a man—he was interested in that man. He asked him about his work—"How many tons of steel have you poured tonight?" Then he did something about what that man told him. Charlie Schwab didn't realize that he was creating something that was going to carry that same crew to 36 tons of steel in an eight-hour shift!

Emotional Pay. One reason we have trouble in industry is that we've had to "de-skill" our jobs in order to simplify training. Look at the automobile industry in its assembly line work. What do the workmen do? One man picks up a nut, puts it over there. Another man picks it up and starts it on the stud. Another man runs it down with an air wrench. Another man gives it a pull with a friction-loaded torque wrench, so that it is drawn up with the right degree of tightness. It takes four men to get one nut on. Is there any emotional take-home pay for those particular men?

A vice president of General Motors once told me, "It's so hard to tell a man that he's built an automobile when he's put one screw in one hinge on one door."

Yet, you can do it! No matter what a man's job is, you can impress him with the importance of the product, the importance of getting the job done, the importance of timing, the importance of movement—you can make sure that he has some emotional take-home pay.

Job Satisfaction. Let's look now at some research findings by the University of Michigan last year on "The Keys to Happiness in Jobs in the Utility Companies." What personal satisfaction, other than good pay, makes a job worth while? There are five sources of satisfaction, according to this detailed study involving interviews with 2,500 employes.

1. *Recognition:* the need to feel that one's achievements are made known to others — a little bit of recognition for a job well done—was first. Remember, Charlie Schwab wrote "18" down on the floor, then moved it to the bulletin board, and the race was on.
2. *Achievement*: the need to feel that one has done something worth while or important—was the second source of satisfaction.
3. *Autonomy*: the need to feel that one has responsibilities and power in one's area of action was third. Remember Tony, in charge of his area for housekeeping.
4. *Affiliation*: the need to have friends and be in communication with others.
5. *Evaluation*: the need to feel that there are reasonable standards for judging work in a particular plant.

What are we talking about? First, we are talking about human dignity. Everyone wants to be somebody. Everyone wants to be important, no matter in what level of society he is. We want some job satisfaction from the work that we're doing. It doesn't matter whether you're the newest janitor, or whether you're an executive vice president at the top of the totem pole. You want that sense of belonging. You want to feel the importance of the contribution that you're making to your company, and to society in general.

Let's go back and say again, if we want to destroy a man's usefulness, give his job the character of uselessness.

Keep Employes Informed. How many men in your plant realize that 80 percent of all drugs are petroleum derivatives, that 98 percent of all the plastics produced in this country are from petroleum; that our consumption of plastic is nearly up to our consumption of steel; that 60 percent of all rubber and 62 percent of all soaps and detergents come from oil; that 27 percent of all textiles in this country are petroleum derivatives?

Does that man of yours fully realize the tremendous importance of the petroleum industry? Does he know that in 100 years we have grown from two oil products to over 2,500? Does he realize that petroleum affects him from the cradle to the grave? Does he know that the baby oil that he is first rubbed down with when he comes into this world is a petroleum derivative? Does he know that the hydraulic oil that lets his casket down into the earth is also a petroleum derivative?

It's tremendously important that we talk to people, that we know people. What's worse than a situation in which a manager, or a supervisor has an employe who's been with him three, four, five years—a man who passes him in the hall and nods at him, and whose name he doesn't know? I visited a headquarters in which a man told me, "I have worked for so-and-so for eight years, and he doesn't even know my name!"

Foothold for Unions. I'd like to quote from *Dynamics of Industrial Democracy,* by Clinton Golden and Harold Ruttenberg, et al. Who are they? They're professional negotiators for small companies—professional contract negotiators for 828 firms employing 660,000 people. These men say in their report:

"One of the compelling motives for union membership (and we're talking about small companies) is the desire of workers for personal

dignity and for some meaning to their lives. They join unions to become something more than a number that is ordered around as a piece of material is moved. They crave to be recognized as human beings, to be treated with respect, to be given the opportunity to find satisfaction in their daily work through the free play of their inherited creativeness, to win the praise of their fellow workers, and to secure personal recognition and advancement of their ideas. The dynamic quality, the militancy, and the crusading spirit of the labor movement in the last decade, were nurtured by the failure of management to satisfy the non-economic needs of the worker."

If you take nothing away with you from this article but one thought, remember that the non-economic needs of the worker must be met.

Management's Fault. Some time ago the *Reader's Digest* asked people to write them on "What's Wrong with Management?" There were 8,000 workers who did. The answers they gave to that question had a dominant theme. It was: "I'm a human being, not a machine. I'm a partner in American war production; why can't management treat me as such? We are supposed to be shoulder to shoulder in a democracy, but management does not act that way. Management does not realize that we are human beings."

Let's go next to the Gallup Poll, one of the American samplers of public opinion. I'll quote only one paragraph:

"The general public thinks there are about as many things wrong with employers as there are with unions. The chief complaint of these employes was not what you might expect — low wages. More people named a broader, more inclusive fault. It is summed up in one reply, which was typical of the thousands that were sent in: 'Management hasn't got enough understanding of working people and their problems. Businessmen keep thinking of labor as a commodity instead of as human beings. The reason people join unions is that they feel the boss won't pay any real attention to the welfare of the worker if left to himself. He's got to be forced to do things'."

It's a sad commentary on American leadership when the workers still are asking that they be treated as human beings in the place where they work. There is the economic motive for which there are countless illustrations in terms of major increases in output and reduction in operating costs. One company alone saved half a million dollars in the cost of accidents in a two-year period through improved personnel administration — through handling people better.

About the Author

Stephen G. Henry (Maj. Gen., U.S.A., retired) is manager of community relations for Ethyl Corp.'s Baton Rouge manufacturing plant, where he directs press, radio and TV relations, and edits a company news bulletin and plant magazine. In 1916 he was commissioned a second lieutenant, Louisiana National Guard. After receiving a B.S. degree from Louisiana State University in 1917, he served during World War I in France and Germany. Following the war he attended numerous Army schools and did graduate work at Massachusetts Institute of Technology. Henry conceived, organized and operated one of the largest technical schools in the United States —the Armored Force School, Fort Knox, Ky., with a peak enrollment of about 40,000 students.

He served overseas during World War II in Africa, Italy, France, Germany and the Western Pacific Theater and on General George C. Marshall's staff as the War Department's first director of research and development activities. Later he was assistant chief of staff for personnel.

Henry retired from the Army in 1946 and joined Ethyl in 1947 as special assistant to the vice president in charge of manufacturing. He was named manager of plant and employee services in 1947, a position he held until his current appointment in 1951.

Role of Supervisor. The foreman or the immediate supervisor of each individual is the key man. At all levels in the organization, a worker's immediate superior is the one who translates to him the policies and problems of the company and even its dreams and aspirations. It is the supervisor who converts top management's ideas into the human terms that will be understood by the people he supervises. So long as good human relations are practiced at every level in an organization, that organization is likely to have good morale and spirit plus understanding and respect for management's decisions.

Before closing, let me summarize for you the major points I have tried to bring to you about dealing with people—about human relations in your industry.

First, we must remember that employes want to be treated as human beings. They want recognition, a sense of achievement, autonomy, affiliation, and some sort of evaluation of their contributions to their company.

Second, there are ways you can help your employes obtain those desires. Tell them about the importance of your business and their importance to that business. Assure them job satisfaction by assigning them responsibility. Consider the names that you give to their jobs. Know your people and let them know of your interest in them.

And, above all, remember that you have the responsibility of going a step beyond providing their material or economic requirements. You have the responsibility of satisfying the many non-economic needs of those employes by looking at some of the requirements of job satisfaction and the improved productivity that goes with that satisfaction. —The End

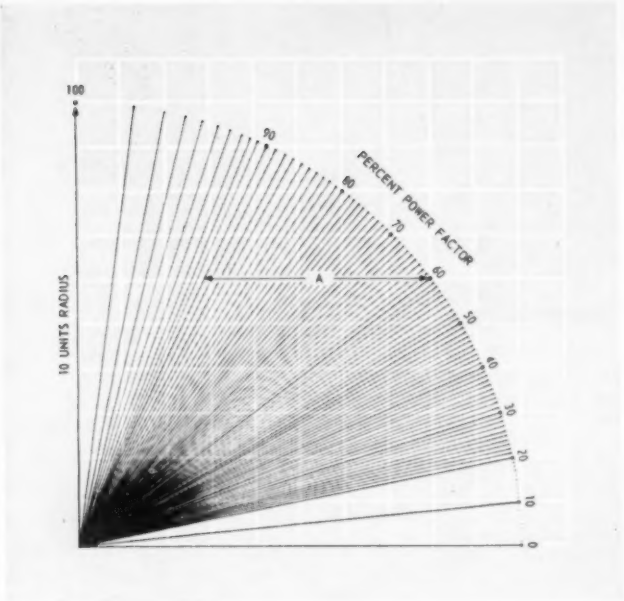


FIGURE 1—Capacitor size (shown by line A) is measured from PF point to radial line of higher PF desired.

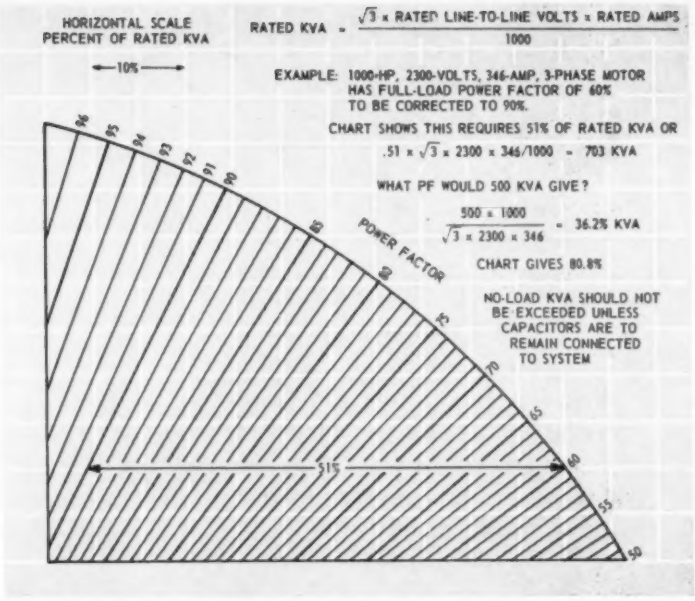

HORIZONTAL SCALE
PERCENT OF RATED KVA
10%
RATED KVA = √3 x RATED LINE-TO-LINE VOLTS x RATED AMPS / 1000
EXAMPLE: 1000-HP, 2300-VOLTS, 346-AMP, 3-PHASE MOTOR HAS FULL-LOAD POWER FACTOR OF 60% TO BE CORRECTED TO 90%.
CHART SHOWS THIS REQUIRES 51% OF RATED KVA OR
.51 x √3 x 2300 x 346/1000 = 703 KVA
WHAT PF WOULD 500 KVA GIVE?
500 x 1000 / √3 x 2300 x 346 = 36.2% KVA
CHART GIVES 80.8%
NO-LOAD KVA SHOULD NOT BE EXCEEDED UNLESS CAPACITORS ARE TO REMAIN CONNECTED TO SYSTEM
POWER FACTOR
51%

FIGURE 2—Enlarged portion of chart may be used for most power-factor correction problems to obtain greater accuracy.

How to Simplify Motor Power-Factor Corrections

You can solve power factor problems with a compass, straight edge and graph paper

By G. R. Brooks
Motor Generator Department
Allis-Chalmers Mfg. Co., Milwaukee

HERE'S A QUICK answer to induction motor power-factor correction problems. Using the accompanying charts, you can find answers to these two important questions:

1. How much capacitance is needed to correct the power factor of an induction motor?
2. What power factor will be obtained with a given capacitor and motor?

Use of the chart requires only motor name plate and no-load current data. The no-load current may be measured or obtained from the motor manufacturer.

For the sake of simplicity, it is assumed that the amount of capacitance used will in no case exceed the no-load motor kva and that the motor does not overspeed when disconnected. If more capacitance is desired or if overspeed should occur, a closer study should be made.[1] It may be necessary to select a capacitor location other than on the motor side of the motor starter.

A large sheet of graph paper suitable for showing a quadrant of a circle having a radius of 10 units, each unit easily divisible by 10, is used. The quadrant is drawn as shown in Figure 1. Then a dot is placed on the quadrant at its intersection with each horizontal unit line. Radial lines are drawn from the center of the quadrant to each of these dots. The power-factor values are added to the chart as shown. The one percent divisions are indicated in like manner.

Capacitor size is in percent of rated motor kva as measured horizontally from full-load power-factor point on the quadrant to radial line of power factor as corrected.

Example shows chart application. Given a 1000-hp, 2300-volt, 346-amp, 3-phase, 60-cycle, squirrel-cage induction motor with full-load PF of 60 percent and no-load current of 190 amps, how much external capacitance is required to raise power factor to 90 percent?

Let E = phase volts, I = phase amps, m = phases.

$$\text{No-load kva} = \frac{E \times I \times m}{1000} = \frac{2300}{\sqrt{3}} \times \frac{190 \times 3}{1000} = 757 \text{ kva}$$

$$\text{Full-load kva} = \frac{2300}{\sqrt{3}} \times \frac{346 \times 3}{1000} = 1380 \text{ kva}$$

From the chart in Figure 2, 51 percent of full-load kva or .51 × 1380 = 704 kva of capacitance is required to correct from 60 percent to 90 percent power factor.

The 704-kva capacitance does not exceed the 757 kva at no load and can therefore be located across the motor terminals with safety if the motor coasts rather than overspeeds when removed from the line.

What power factor will be obtained if a 500-kva capacitor is used instead of the 704-kva rating?

Percent of rated kva = 500/1380 × 100 = 36.2 percent.

When 36.2 percent is laid off horizontally from the 60 percent PF full-load point, 80.8 percent power factor is obtained.

The chart provides quick answers to the two common problems on motor power factor—the quantity of capacitance needed to correct a given power factor, and the power factor obtained when using a given capacitor. Once constructed, the chart will apply for any induction motor.

LITERATURE CITED
[1] "Applying Capacitors at Motor Terminals," R. C. Moore and W. E. Schwartzburg, Allis-Chalmers Electrical Review, 4th Quarter, 1958.

Pipe Line Pete's

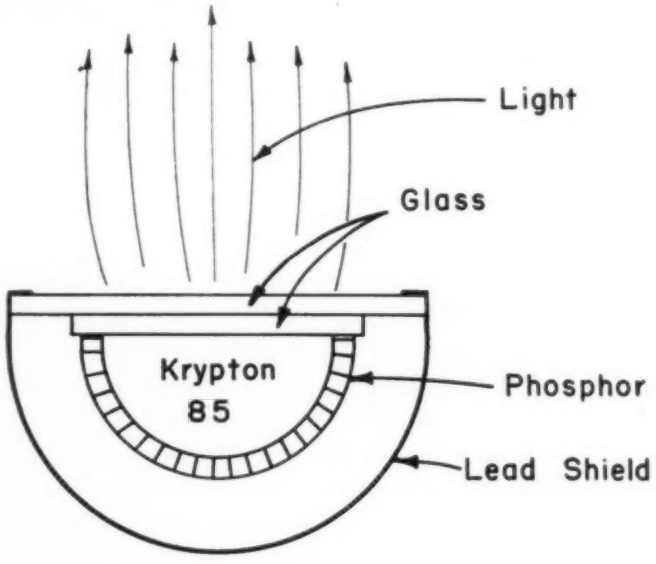
IDEAS FOR THE FUTURE!

... in pipe line engineering, construction and operations

By Donald M. Taylor, Engineering Editor

New Sources of Light, Power; Stronger Ceramic Developed

United Kingdom atomic scientists have developed light from radioactive sources which is visible for half-a-mile and produces sufficient illumination to read a newspaper 4 feet from the light.



Radioactive gases—krypton 85 or tritium is sealed in a light source shaped like an automobile headlight. The reflector is coated with a phosphor—zinc sulfide or cadmium sulfide have proved most successful of those tested so far.

This spark-free illumination would make an excellent device for use around pipe line stations. Its life depends on the half life of the radioactive source.

New Sources of Power

Magnetohydrodynamic Generator. This new device, developed by General Electric extracts electricity from the motion of ionized gas passing through a magnetic field. In this instance, air—heated to some 5,000° F to ionize it—is passed through a quartz tube in a magnetic field. Electrodes on opposite sides of the tube collect the current. Efficiency is low today, but engineers expect to achieve 80 percent or so in the future. Best possibilities for the pipe line industry—using it in conjunction with other power sources: engine exhaust, etc.

Metal-Like, Almost-Transparent Ceramic

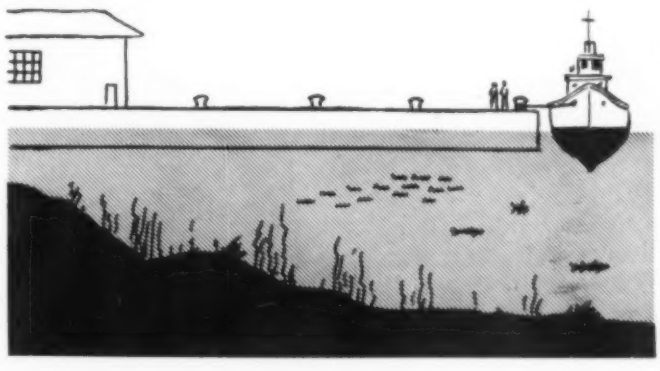
A new ceramic—labeled by one scientist as "one of the most significant advances in ceramics in a hundred years"—can transmit light and withstand temperatures up to 3,600° F. Moreover, it has amazing strength—something like 50,000 psi transverse rupture strength!

This new material was developed by General Electric Research Laboratory. It is made by pressure forming high purity aluminum oxide at room temperatures and firing it at very high temperatures. This new ceramic should prove useful in engine and turbine construction.

Porous, Lightweight Concrete Has Many Uses

Engineers are devising ways to make concrete lighter. In California, one company has announced a new line of docks and piers made of porous reinforced concrete which floats. Elsewhere, another company, Mearl Mfg. Corp., announced that a new preparation made from protein-rich fish scales can be used to foam concrete making it lighter. Result—a concrete with density that can be controlled from 10 to 120 pounds per cubic foot.

This new material should be of great interest to pipeliners engaged in marine work.



Proton Microscope Promising; New Lubricants Successful

The first protonic microscope which uses protons rather than electrons will allow scientists to see six times deeper into the minute world of matter. Built by French scientists the instrument uses protons which have a much shorter wave length than electrons used in conventional high-powered microscope. This alleviates the problem of diffraction.

The new instrument is not only the world's most powerful, it is probably the world's largest microscope. It is a complex structure standing almost 8 feet high.

The impact of the new microscope will likely be far-reaching in the fields of medicine, physics, metallurgy and chemistry.

Dry Lubricant Is a Success

The U.S. Naval Air Material Center in Philadelphia has developed a dry film lubricant which is able to withstand temperatures ranging from —300° F to 750° F. In one test the lubrication film lasted 240 hours while bearings were run at 1250 rpm in a 350° F environment.

The film is composed of 55 percent molybdenum disulfide, 6 percent graphite and 39 percent sodium silicate binder. The film will withstand radioactivity and corrosive liquid oxygen.

Free Piston Engine Responds to New Lube

The biggest problem thus far in the development of free piston engines has been in the field of lubrication. Heat broke down lubrication and wear was said to be excessive on bottom of the cylinders.

Esso Research and Engineering Co. developed a new lube oil, known as Tro-Mar FP-50, which enabled the converted Liberty ship G.T.S. William Patterson to make a series of trans-Atlantic runs with relatively little engine wear and no break-down of lube oil.

Free piston engines which have intrigued the pipe line industry for some years may be just around the corner at last!

Ice Caps to Melt?

We are increasing the amount of carbon dioxide in the air by burning our so-called "fossil" fuels—coal, oil and gas. Dr. Edward Teller, father of the hydrogen bomb, told a symposium on "Energy and Man" at Columbia University recently, that the effect of this increase will be to lessen the earth's ability to radiate heat. Toward the end of the century he predicts that the CO_2 percentage in the air will have increased by some 10 percent over its natural level. This may cause the polar caps to melt, raising the sea level. (Also, it will mean more air conditioning sales to Eskimos.)

Advanced Construction Methods and Improved Metal Spark Test

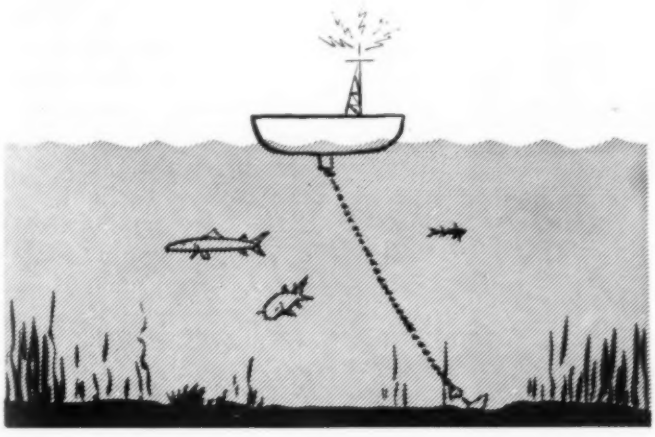
By drilling 26 holes and circulating chilled brine in them, a contractor froze a 36-foot diameter solid cylinder of earth 123 feet deep. Workmen are now excavating a 14½-foot shaft in the middle of the frozen chunk. They will next line it with concrete. From this point they will excavate some 200 feet deeper through solid rock and then tunnel a sewer line beneath the East River, that separates New York and Brooklyn. This method of underground water control has been used by the mining industry since 1880.

New Method for Testing Sparking Characteristic

A spark test using a gasoline and oxygen-enriched air mixture provides a clear distinction between safe and unsafe metals to use in an explosive environment. The test was developed by the Navy and the findings have been published by the Department of Commerce. Unsafe metals include carbon steel, high-speed tool steel, stainless steel and cupro-nickel alloys. Metal wheel and metal rod combinations were found safe; abrasive wheel and metal rod combination were unsafe.

Automatic Gulf Weather Buoys

The Bureau of Standards developed (see PIPE LINE INDUSTRY, May 1956, Page 38) automatic buoys which have been anchored in the Gulf of Mexico to send



weather reports every 6 hours to U.S. Navy shore stations. Not only do they provide information on hurricanes, they also give weathermen temperatures barometric pressures etc. Results have proven very satisfactory.

Magnetic Flow Meter Coming

Sometime soon, the conventional orifice and the displacement meters in common usage now, will get a tough new competitor; **a magnetic flowmeter!** This new instrument, under development by many instrument companies, works on a principle as old as the first electrical generator. When a conductor passes through a magnetic field, an electrical potential is generated. The magnetic fields being equal, the greater the velocity of the conductor, the greater the potential.

Thus, it is possible to measure fluids which are conductors simply by measuring the intensity of the current. To measure non-conductive materials such as hydrocarbons, one company has developed a highly concentrated additive which will raise the conductivity.

Most instrument engineers working on the new meter praise its accuracy already said to be within one percent!

Coating Process by Corona not Electrostatic!

There is a correction concerning this column last month (January 1960, Page 48) on the item New Tools Tested for Internal, In-Place Coating. In the fifth paragraph, the coating process is said to be "electrostatically" charged. This is not correct. The sentence should read. "The coating is applied in some cases with the assistance of high voltage-high-frequency corona."

More Mileage Out of Older Horizontals

Continued from Page 50

automatic float valves on the lubricators and automatic liquid level controls on the crankcases of all the angle type engines on the system.

Improving Bearings. The third step in the modernization program is to improve the bearings on the horizontal engines. The modern angle type engine is now equipped with bi-metal and tri-metal bearings which have proven to be much superior to the old babbitt type bearings. For the older engines the company is experimenting with both the bi-metal and tri-metal bearings. A tri-metal bearing is being used for the cross-head pin; this bearing shell is either cast steel or nodular iron, and a bronze surface is bonded to the shell which, after machining, provides a foundation for the babbitt. It is believed that these changes will result in longer bearing life.

Other Ideas. Cities Service is also trying out two or three other innovations in its operations.

These include a semi-automatic loading system on the engines at Alva compressor station. This system will permit the engineer to operate the intake, discharge and bypass valves and load each engine from a control panel located adjacent to the starting stand. This system should provide better and more economical operation.

Sequencing Controls. It is also planning to install on one of the engines at Corwin station an automatic starting system which will permit the starting of an engine by simply pushing one button on the control panel. This system would permit the engineer to observe water temperatures at eight points on the engine, bearing temperatures on six different bearings, water pressure, oil pressure, starting air pressure, fuel gas pressure and engine speed from the control panel.

Engineers are now in the process of completing the design. Cost of this installation and its benefits will be determined from future experience.

ACKNOWLEDGMENT

Photos courtesy the *Dispatcher*, Cities Service Gas Co., Oklahoma City.

WHAT'S HAPPENING

IN PIPE LINE CONSTRUCTION

By Donald G. DePugh, Construction Editor

Internally Coated Loop Line Laid By Transco

Transcontinental Gas Pipe Line Corporation began its 1960 looping program near Liberty, Texas. Panama-Williams Corp. is laying 15 miles, 30-inch of internally coated pipe. Pipe was yard-coated at Syd E. Culbertson, applying internal coating and an asphalt enamel external coating.

Tennessee Gas, Midwestern Plan Construction Expansion in 1960

Tennessee Gas Pipeline Company and Midwestern Gas Transmission Company, subsidiary of Tennessee Gas Transmission Company, will spend over $48 million on its 1960 joint construction program.

Including facilities previously authorized, but not built, and those proposed in recent application before FPC, Tennessee Gas will lay 155 miles, 30- and 36-inch loops in Ohio, Pennsylvania and New York; 76 miles of gathering lines, and install an additional 31,300 horsepower at five stations. Cost will be about $43 million.

Midwestern, which completed its Portland, Tenn., to Joliet, Ill., system last year, plans to add 14,000 horsepower to its line at a cost of $5 million.

With the new facilities Tennessee Gas will increase its average day capacity to 2.8 billion cubic feet of gas; peak-day capacity including underground storage, would be 3.2 billion. Midwestern, which receives its gas from Tennessee Gas at Portland, Tenn., would up its capacity 60 MMcf per day.

Included in four applications recently filed with the FPC, is Tennessee Gas' proposal to install 6,500 additional horsepower to supply an additional 20 MMcf of gas daily to Midwestern. Midwestern, in turn, plans to deliver the gas to a new customer, Illinois Power Company of Decatur, Ill.

In another application, Midwestern has received FPC permission to construct its 504-mile, 24-inch gas line from Canadian-Minnesota border to Marshfield, Wis., at a cost of $52 million.

Houston, Coastal Plan $18 Million Expansion

Expansion plans for $18 million in construction have been announced by affiliated companies, Houston Texas Gas & Oil Corporation and Coastal Transmission Corporation.

Houston proposes to construct 199 miles of 2- to 6-inch laterals and install 4,000 horsepower units in five new stations. Cost would be about $12.5 million.

Coastal will lay 81 miles, 3- to 10-inch laterals; install new stations at Port Lavaca, Texas (2,200 hp), and Eunice, La. (3,300 hp), and add 1,500 hp at its Robstown, Texas, station. Cost will be $6.2 million.

Pacific Lighting Gas Awards Joint Contract on Main Line

Engineers Limited Pipeline Company and Pacific Pipeline Construction Co. have been awarded a joint contract for the Pacific Lighting Gas Supply Company main line from Needles to Newberry, Calif.

In an earlier release Pacific Lighting Gas Supply Company announced that Pacific Pipeline Construction Co. had contract for complete job, including double-jointing and coating (PIPE LINE INDUSTRY, JANUARY 1960, Page-60). Actually changes were made subsequent to that announcement. Engineers Limited and Pacific Pipeline will lay the line and Pacific Pipeline will handle the coating and double-jointing.

Missouri Valley Dredging Company has been awarded a contract for construction of the dual 24-inch crossing of the Colorado River near Needles, Calif.

Goliad and Union Plan 85-Mile Products Pipe Line

Goliad Corporation and Union Oil Company of California plan a joint $12 million venture which includes an 85-mile liquid line in Louisiana.

The firms will construct a refrigerated oil absorption extraction plant to be located some nine miles south of Kaplan, La. The pipe line will extend from the extraction plant to a plant site on the east bank of the Mississippi River south of Baton Rouge.

The proposed plant at the terminus will separate raw liquids into petrochemical charge stock, propane, isobutane, normal butane and natural gasoline.

Esso Standard Libya Plans 100-Mile, 30-Inch Oil Line

Esso Standard Libya expects to complete survey by May of route for crude line from Zelten oil field to Gulf of Sirte coast. Line is scheduled for operation in 1962.

The 100 miles of 30-inch pipe has been ordered.

Montana-Dakota Proposes 15-Miles, 6-Inch Gas Line

Montana-Dakota has filed an application with the FPC for construction of 15 miles of 6-inch gas main lines and 2 miles of 4-inch field lines to serve the Glasgow Air Force Base in Valley County, Mont. Included in the proposal are construction plans for 1,540 additional compressor horsepower.

Crude System Planned In Saxony Oil Fields

The Hanover Pipeline Corporation has been formed to build a crude oil system in Lower Saxony oil fields. The system will total approximately 200 miles. Hanover is being formed by Gewerkschaft Elwerath and Preussische Bergwerks und Huetten-AG.

The first line will connect fields of Hohenassel, Broistedt, Moelme, Oberg Schmedenstedt and Hillerse-Meerdorf with the Misburg refinery through the Eddesse group of fields. System will be extended to Leiferde, Nienhagen-Haenigsen and Ruehme fields.

Columbia Gulf Authorized To Install Turbine Unit

Columbia Gulf Transmission Company has received FPC authorization to install an experimental gas turbine compressor unit at an existing station near Clementsville, Ky.

Certificate permits operation of the modified jet-turbine unit only for an 8,000-hour or 18-month test period. If the company desires to operate the new compressor for a longer period, it must obtain FPC authorization. Installation of the 10,500 hp unit will cost $1.5 million.

Program Completed For Canadian Pipe Line Contractors Convention

A full program has been arranged for the sixth annual convention of the Pipe Line Contractors Association of Canada to be held February 25-27 at Empress Hotel in Victoria, B. C.

Five guest speakers will highlight the three-day meeting which will be attended by pipeliners from Canada and United States. Mayor Percy B. Scurrah of Victoria will deliver the address of welcome to the Association. The Honorable W. K. Kiernan, Minister of Mines for the Province of British Columbia, is one of the scheduled speakers. J. C. Mahaffy, Alberta Gas Trunk Line Company Limited general manager, will speak on "The Future of Gas Transportation in Alberta" and the Honorable Alvin Hamilton, Minister of Northern Affairs & National Resources for Federal Government will address the convention. Charles D. Bailey, chief engineer, Trans-Mountain Oil Pipe Line Co., will speak on "The Owner and his Contractor."

President D. J. Baldwin will open the first session of the meeting with the president's address. New officers and directors of the association will be elected on the final day of the convention.

Further information on the annual meeting can be obtained from the Pipe Line Contractors Association of Canada, 301 Northern Hardware Building, Edmonton, Alta.

American Louisiana to Add Two New Compressor Stations

The FPC has authorized American Louisiana Pipe Line Company to install an 8,000-horsepower compressor station in Louisiana and a 10,000-hp station in Tennessee at a cost of about $6 million. The FPC also gave approval for Michigan Wisconsin to take an additional 40 MMcf of gas daily into its system.

Polypropylene Line Baytown to Texas City

Humble Oil & Refining Company is planning a 34-mile, 4-inch polypropylene line from its Baytown refinery to Texas City, Texas. It will carry medium-purity olefin to Union Carbide.

FPC Approves Coastal Budget Type Application

A budget-type construction program for Coastal Transmission Corporation has been approved by the Federal Power Commission. Coastal was authorized to build facilities not in excess of $1 million.

Sharman, Allen, Gay & Taylor Awarded Contract by Magnolia

Sharman, Allen, Gay & Taylor, Inc., has been awarded a contract by Magnolia Pipe Line Company to lay 32 miles of 12-inch in Cameron, La.

Tennessee Gas Pipeline Co. Lets Contract to Western

Tennessee Gas Pipeline Company has awarded a contract to Western Pipe Line, Inc., for construction of 12,180 feet of 8-inch and 17,109 feet of 10-inch gas lines in Plaquemine Parish, La.

Collins Construction Co. Employe Fatally Wounded

Paul Todd, 28-year old project engineer with Collins Construction Company on its Fao, Iraq, pipe line spread, died Jan. 15, after being shot Jan. 9.

Todd and co-worker Robert Stiles, 40-year old labor relations manager, were shot by a discharged Iraqi employe.

Todd was from Sulphur, La., and had been operated on following the incident. Stiles and Todd were working on the 32-inch submarine line in the Persian Gulf for Basra Petroleum Co.

Transwestern Completes Financing For Construction of 1,809-Mile System

Transwestern Pipeline Company's gas line from Texas to California came a step closer to reality last month with the announcement that over $200 million has been raised for construction of the system.

In the company's first progress report to stockholders, it was announced that Transwestern and its gas suppliers had accepted all FPC certificates necessary to complete approval of the 1,809-mile project.

With 11 spreads working in Texas, New Mexico and Arizona, construction progress is up to schedule and the company expects completion by July of this year. A total of 475 miles of right-of-way has been cleared and 178 miles of main line has been laid. Preliminary work on stations is underway and the carbon dioxide removal plant in Puckett Field, Texas, has been completed.

Transwestern is awaiting approval from FPC on application made December requesting permission to construct additional facilities costing $5 million.

PROPOSED PIPE LINE CONSTRUCTION

Here in convenient summary form is Pipe Line Industry's listing of company, line size, length, service, location and project status.

U. S.

Alaska Juneau Gold Mining Co., Los Angeles, 425 miles, 16-inch, gas, Oklahoma City area to St. Louis, planned.

Anchorage Gas Corp., Houston, 165 miles, 12-inch, gas, Kenai to Anchorage, Alaska, $15 million, planned.

Arkansas Industrial Pipeline Corp., Shreveport, 130 miles, 18-inch, gas, Perla-to-Helena, Ark., $9 million, planned.

Atlantic Seaboard Corp., Charleston, W. Va., 26-miles, 26 and 20-inch, gas, in West Virginia, Virginia and Maryland, contract let on 19 miles to H. L. Gentry Construction Co.

Carolina Pipeline Co., gas, main line, from near Aiken to Pontiac, S. C., $5 million, approved.

Coastal States Gas Producing Co., Corpus Christi, Texas, 289 miles, 14 and 18-inch main line and gathering system, McAllen to Falfurrias, Tex., area, and Lopena to La Salle County, $12 million, contract let on 200 miles to O. R. Burden Construction Corp.

60 miles, small diameter, gas gathering line, to tie in with system under construction and extend to Pearsall County, Texas, planned.

25 miles, gas, Associated Gas & Oil Co. field to South-Tex Corp., processing plant west of Corpus Christi, Texas, planned.

37 miles, gas gathering in Brown, Eastland, Comanche and Erath counties, Texas, planned.

Coastal Transmission Corp., Houston, 81 miles, 3 to 10-inch, gas, laterals; 5,500 hp in stations at Port Lavaca, Texas, and Eunice, La., and additional 1,500 hp at Robstown, Texas, $6.2 million, before FPC.

Colorado Interstate Gas Co., Colorado Springs, 140 miles, gas, Green River, Wyo.-to-Provo, Utah; 109 miles, 26-inch, Texas Panhandle to southeastern Colorado; 136 miles, 34-inch, southeastern Colorado-to-Pueblo, Colo.; 107 miles, 30-inch, Pueblo-to-Denver, $91 million, before FPC.

Colorado Oil & Gas Corp., Denver, 400-miles, gas, from Gubik field to Fairbanks, Alaska, planned.

Columbia Gulf Transmission Co., Houston, 12.8 miles, 6 and 20-inch, gas, loop line in Louisiana, $730,000, authorized.

East Coast Pipeline Co., 90 miles, 12- to 24-inch, products, Linden, N. J. to Suffolk County, N. Y., $25 million, planned.

El Paso Natural Gas Company, El Paso, 244 miles, 30-inch, Permian-San Juan loops, 108 miles, 20-inch, field feeder lines, before FPC.

69,240 hp in new and existing stations in Texas, Oklahoma, New Mexico and Utah, planned.

400 miles, 34-inch, Salt Lake City, Utah, to California border, before FPC.

Equitable Gas Company, Pittsburgh, Penn., 11.7 miles of storage pipe line and other facilities, $2,091,430, authorized.

12½-miles, 16-inch, paralleling existing system in Harrison and Marion counties, W. Va., authorized.

Florida Pipeline & Storage Co., 54 miles, products, Port Everglades to Homestead Air Force Base, Fla., planned.

Gillette Pipeline Co., Cheyenne, Wyo., 103 miles, crude, from Dead Horse Creek field to Casper, Wyo., planned.

Goliad Corp., Houston (Joint venture with **Union Oil Co. of Calif.**), 85 miles, LPG, Kaplan, La. to Baton Rouge, extraction plant at Kaplan and fractionation plant at Baton Rouge, $12 million, planned.

Great Northern Railway, St. Paul, 400-600 miles, 12-20 inch, crude, from Williston Basin to St. Paul-Minneapolis and Duluth-Superior areas, considered.

Gulf Resources, New York, 125 miles, gas, gathering system, from Lopena area in Zapata County to a point in La Salle County, Texas, planned.

Hope Natural Gas Co., Clarksburg, W. Va., 45 miles, gas, from West Virginia to Pittsburgh area, planned, 20 miles, 24-inch, gas, in Wertzel and Monongalia counties, W. Va., authorized.

Houston Texas Gas & Oil Corp., St. Petersburg, Fla., 199 miles, 2 to 6-inch, gas, laterals; 20,000 hp in five new stations; $12 million, before FPC.

Humble Oil & Refining Company, Houston, 116 miles, gas, gathering various sizes, southwest Texas, contracts let on 57 miles to O. R. Burden Construction Corp. and H. B. Zachry Co.

Iron Ranges Natural Gas Co., 115 miles, gas, from Itasca and St. Louis counties along route of Mesabi range from Grand Rapids to Aurora, Minn., $5 million, FPC authorization.

60 miles from Duluth to Silver Bay, Minn., FPC authorization.

Kansas-Nebraska Natural Gas Co., 15 miles, 12-inch, gas, loops and 4,800 additional hp at new and existing stations, $1.5 million, FPC authorization.

Michigan Wisconsin Pipe Line Co., Detroit, 311 miles, gas, Marshfield to Appleton, Wis., 66 miles, Illinois, Indiana, and Michigan, 5,280 hp station at Marshfield, $24 million, FPC authorization.

Midwestern Gas Transmission Co., Houston.

504 miles, 24-inch, gas, from Minnesota-Canada border near Winnipeg to Marshfield, Wis., $52 million, FPC authorization.

Missouri-Kansas-Texas Railroad, 1400 miles 8-12 inch LPG line, Midland, Texas, area to St. Paul-Minneapolis, Minn., and Madison, Wis., $55 million, planned.

Montana-Dakota Utilities Company, Minneapolis, Minn., 15 miles, 6-inch, in Montana, gas 1,540 additional hp, $1 million, before FPC.

Natural Gas Pipeline Company, Chicago. 151 miles, 36-inch, gas, loops, between Ford County, Kansas and Joliet, Ill. and 180 miles, 24-inch, main, from Minneola, Kansas to Kiowa County, Okla., $31 million, before FPC.

Northern Natural Gas Company, Omaha. 171 miles, main line extensions, 66 miles, main loops, 139 miles, branch lines, 6,000 hp additions, to extend system from Minneapolis to Duluth-Superior area. $25.7 million, contracts let on 315 miles to Williams Bros. Co. and R. H. Fulton & Co.

46 miles, main line extensions, 191 miles, loops, 1,767 miles, branch lines, and 45,400 additional hp, in Iowa, Minnesota, South Dakota, Nebraska, Wisconsin and Illinois, $76.7 million, FPC authorization.

37 miles, 30-inch, Bushton compressor station to Otis field, Kansas, 7,000 additional hp at Bushton, and development of underground storage facilities at Otis field, $20 million, before FPC.

Ohio Fuel Gas Co., 59 miles, gas, 4-24-inch main lines, in Belmont, Carroll, Cuyahoga, Fairfield, Logan, Lorain, Marion, Muskingum, Stark and Wayne counties, Ohio, $5.1 million, planned.

Pacific Gas & Electric Co., San Francisco, 296 miles, 36-inch, gas, from Klamath Falls, Ore., to Antioch, Calif., southern section of line from Canada to California, before California Public Utilities Commission.

131 miles, 34-inch, loops, Topock-Milpitas, before FPC.

42 miles, 30-inch, gas, Pittsburg to Irvington, Calif., planned.

Pacific Gas Transmission Co., San Francisco, 614 miles, 36-inch, Kingsgate B.C. to Klamath, Ore., northern section of Canada to California line, before FPC.

Pacific Lighting Gas Supply Co., 128-mile, 34-inch, gas, main line from Topock, Ariz. to Newberry, Calif., contract let to Pacific Pipeline Construction Co., Engineers Limited Pipeline Co., and Missouri Valley Dredging Co.

Pacific Northwest Pipeline Corp., Salt Lake City, 100 miles gas, gathering lines in San Juan Basin, Garmesa, Piceance Creek, and Big Piney Fields, $3.5 million, planned.

59 miles, 16 and 20-inch, gas, from a point on main line near Camas, Wash., to Salem, Ore., $6.1 million, before FPC.

Permian Basin Pipeline Company, Omaha. 83 miles, 16-inch, gas, from Pioneer's proposed facilities to Spraberry, Texas, and 3,960 hp compressor station, $5 million, FPC examiner approval.

Pioneer Natural Gas Co., Amarillo, Texas, 62 miles, 10-inch main, Pampa, Texas, to Canyon, in Randall County, Texas, 20 miles, small diameter, gathering, 4,000 h.p. stations, $4.5 million, planned.

Phillips Petroleum Co., 25 miles, 6 to 20-inch, gas, South Eunice, New Mexico area, planned.

52 miles, 4 to 20-inch, gas, Gaines County, Texas, planned.

44-mile, 6-inch, products line, from Rocky pump stations to Amarillo, Texas, planned.

Rio Gas Gathering Co., San Antonio, 97 miles, 3 to 8-inch, gas gathering. South Texas. to supply gas to El Paso Natural Gas Company, planned.

Rocky Mountain Natural Gas Company, 65 miles. gas, southwestern Colorado to serve Delta, Orchard City and Montrose, Colo., planned.

Shamrock Oil & Gas Company, 49 miles, 20-inch, gas, Dumas to Amarillo, Texas, planned.

Southern California and Southern Counties Gas Cos., Los Angeles. 200 miles. 34-inch. from Nevada-California border to point near Fullerton, Calif., $44 million, before Public Utilities Commission.

Southern Natural Gas Company, Birmingham, 490 miles. 16-24-inch, loop lines, gas, between Gwinville, Miss., and Wrens Ga; 62 miles, 14-inch, loops, along Atlanta-Macon line; 53 miles, 6⅝ to 14-inch. loops, along various branch lines. 3,140 additional hp at Gallion and Elmore, Ala. and Wrens, Ga. 60 miles. 20-inch, loops, in Louisiana between Franklinton and White Castle and South of Toca. Lateral lines south of Gwinville and west to Cranfield field. 8,720 hp added at Franklinton, White Castle, Patterson and Brookhaven. contracts let on 442 miles to Sharman, Allen, Gay & Taylor; Oklahoma Contracting Co.; Harbert Construction Corp.: C. S. LeNoir Construction Co.; and Buchanan Contracting Co.

Standard Oil Company of California, 22 miles, 8-inch. crude, Kenai Peninsula to Nikiski, Alaska, $4 million, considered.

Tennessee Gas Pipeline Co., Houston, 21 miles. 16-inch. 2 miles, 12¾-inch, gas, Louisiana coast, Vermillion, Blocks 46 and 64, $2.9 million, before FPC.

158 miles, 36-inch. looping system in Louisiana and Mississippi, to supply Midwestern additional gas at Portland, Tenn., $61.4 million, authorized.

Texas Eastern Transmission Corp., Shreveport, La.

65 miles, gas, Delmont, Penn., to Lambertville, N. J., before FPC.

40 miles, Lambertvile to Linden, N. J., before FPC.

350 miles, 24-inch, coal slurry, West Virginia to New York, considered.

Texas Electric Service Company, Fort Worth, 300 miles, gas, Old Ocean field to Fort Worth, Texas, $25 million, considered.

Tensas Gas Gathering Corp., Shreveport, 36.6 miles, gas, gathering system in Rodney Field, Jefferson County, Miss. and from North and South Locust Ridge, Lake St. John Field in Tensas and Concordia parishes, La., $855,413, authorized.

Texas Illinois Gas Pipeline Company, Chicago, 16,000 additional hp to stations at Lufkin, and Marshall, Texas; Texarkana, Malvern, Searcy, and Biggers, Ark.; Jackson, Mo.; and Hammond. Ill., $3.9 million, FPC authorization.

371 miles, 30-inch. loops, and 45 miles, laterals, gas, 6,700 hp station in Victoria County, Texas, $43.5 million, before FPC.

Transcontinental Gas Pipe Line Corporation, Houston, 129 miles, 30 and 36-inch loops; 53 miles of laterals, and additional horsepower capacity, in Texas, Louisiana, Alabama. Georgia, North Carolina, Virginia, Pennsylvania and New Jersey, $53 million, FPC examiner approval.

211 miles, 36-inch. and 69 miles, 30-inch. loops and additional 32,040 hp, in Texas, Louisiana, Mississippi, Alabama, Georgia and South Carolina, $52 million, before FPC.

13 miles, 24-inch and 18 miles, 20-inch loops. Louisiana, FPC authorization. 14 miles, 16-inch laterals, 1-mile, 12-inch lateral, Louisiana, $2.1 million, FPC authorization.

29 miles, 20-inch, gas, and 2,500 hp, in South Texas to take gas from South Texas Natural Gas Gathering Co., $2.4 million, before FPC.

Transwestern Pipeline Company, Houston, pipe line facilities to cost $5.4 million to make available additional gas reserves for the line presently under construction, before FPC.

Underground Storage & Exploration, Upper Darby, Penn., 394 miles, 12-inch LPG, from Moundsville, W. Va. to Newark, N. J., $9 million, approved.

95 miles, 6-8 inch, laterals to Mauch Chunk, Penn., and to Philadelphia, planned.

Valley Gas Transmission, Inc., Houston, 55 miles, 3 to 8-inch, gas, gathering, in Hidalgo, Brooks, Starr and Jim Wells Counties, Texas, $15 million, before FPC.

International

ACT Oils, Ltd., Montreal, 400 miles, crude, Dawson Creek, B. C., to Bella Coola, B. C., before B. C. government.

Alaska-Yukon Refiners and Distributors, Ltd., Edmonton, Alta., 150 miles, products, serving Alaska and Yukon territory, $3.5 million, planned.

Alberta Gas Trunk Line Company, 386 miles, 26-36-inch, gas, main, Berland River area, Alberta, to Alberta-British Columbia border; and 235 miles, 8-18-inch, gas, gathering, Alberta, $100 million, Alberta Oil and Gas Conservation Board, approved.

Alberta Natural Gas Company (Jointly owned by Westcoast Transmission Co. and Alberta & Southern Gas Co. Ltd.) 110 miles, 36-inch, gas, Alberta border to British Columbia-Idaho border, supply gas to Pacific Gas & Electric Co., $40 million, planned.

Arab League Oil Committee, large diameter crude line from Persian Gulf to Mediterranean Coast, $500 million, considered.

Bituminous Oil Pipeline Co., Calgary, 250 miles, crude, from Athabasca tar sand plant in northeastern Alberta to Edmonton, approved.

Burmah Oil Co., Ltd., 850 miles, crude, 20 inch, from Nahorkatiya to Calcutta, India.

Cartier Gas Corp. (St. Maurice Gas, Inc., and Consumers Gas Co., Toronto), 170 miles, gas, Montreal to Quebec City, planned.

Consolidated Gathering Systems, Ltd., Calgary, 198 miles, crude, Sturgeon field to Edmonton, planned.

Creole Petroleum Co., 44 miles, 12-30-inch, gas, Bachaquero to Tia Juana, Venezuela, planned.

Development and Resources Corp., 70 miles, 8 inch, gas, from Agha Jari oil field to Ahwaz, Iran, planned.

Entre Nazionali Idrocarburi, Rome, Italy, crude, from Qum field in Iran to the Mediterranean Sea, considered.

Esso Standard Libya, 100 miles, 30-inch, crude, Zeltan oil field to Gulf of Sirte coast, planned.

Foothills Pipe Line, Ltd., 500 miles, 12 to 16-inch, LPG, from Alberta to Pacific Coast, $80 million, considered.

Hydrocarbons Pipeline, Ltd., Winnipeg, Manitoba, 880 miles, 6-8 inch, products, from Edmonton to Winnipeg, $35 million, partial authorization.

Independent Pipe Line Co., 2,019 miles, 34-36-inch. crude, Edmonton to Montreal, 23,000 pump horsepower, $395 million, before Borden Commission.

Interprovincial Pipe Line Company, 350-mile extension from Toronto to Montreal, looping line from Edmonton to Toronto, crude, $240 million, considered.

Additional horsepower in four new stations and several existing stations, $9.3 million, planned.

Island Transmission Company Limited, Nanaimo, B.C., 25 miles, 10-inch, gas, from point near Vancouver, B.C. to Vancouver Island, 67 miles, 10-inch, laterals to Victoria and Nanaimo, B.C., $14 million, planned.

Mid-Continent Pipe Lines, Ltd., 1500-mile, 30-inch crude, Edmonton to Chicago, planned.

National Iranian Oil Co., 146 miles, 6 inch, crude, from Azna to Isfahan, Iran, $5 million, planned.

1000 miles, 38 inch, crude, from central Iran to the Turkish Mediterranean coast, considered.

500 miles, 8-inch, products, Teheran to Meshed, Iran, contract let on 250 miles to Williams Bros. Co.

Palestine Economic Corp., New York, 135 miles, 16-inch, crude, Eilat to Beersheba, Israel, to be completed July 1960.

Peace River Oil Pipe Line Co., Ltd., 70-mile, crude, Swan Hills to Iosegun Junction, approved.

230 miles, 8-inch, crude gathering, from fields in northeast British Columbia to Dawson Creek, B. C., and Grande Prairie, Alta., and to existing lines at Sturgeon Lake, $8.5 million, authorized.

Pembina Pipe Line, Ltd., Edmonton, 1,200 miles, LPG, from Alberta gas fields to eastern Canada, planned.

Petroleos Mexicanos, 38 miles, 4 inch, products, from Mexico City to Toluca, $500,000 planned.

126 miles, 4, 6 and 8 inch, products, from Mexico City to Cuernavaca and Puebla, $2.5 million, planned.

214 miles, products, Monterrey to Torreon, $6.5 million, planned.

Pipelines of Puerto Rico, Inc., 95 miles, 8-inch, products, Penuelas to San Juan, Puerto Rico, planned.

Rangeland Pipe Line Company Limited, 111 miles, 8-inch, crude, southeastern Alberta to Calgary, $3 million, planned.

Societa Nazionale Metanodotti, 650 miles, 18-inch, crude, Genoa, to Milan-Cremona-Torino, Italy, and Aigle, Switzerland, with extensions to Karlsruhe and Munich, Germany, planned.

Societe d'Etude du Pipe Line Sud-European, Paris, 419 miles, 30-inch, crude, port of Lavera to Strasbourg, with lateral extending 40 miles to Karlsruhe, Germany, approved by French cabinet.

Standard-Vacuum Oil Company, 60 miles, 8-inch, gas, main, in South Sumatra, considered.

Ste. d-Etudes de Pipeline Intercontinetaux, Paris, 1,400 miles, 30-40-inch, gas, from Hassi R'Mel field in central Algeria across Mediterranean, through Spain, France and into West Germany, considered, Fish International Corporation making engineering and feasibility studies.

Sui Gas Transmission Co., Multan, Punjab, India, 145 miles, 8-inch, gas, from Sylhet to Dacca, East Pakistan, $9 million, considered.

130 miles, 16-inch, gas, main line, Multan to Lyallpur, planned.

Trans-Canada Pipe Lines Limited, Toronto, 50-mile, 30-inch, gas, lateral, Winnipeg to Emerson, Manitoba; 74 miles, 34-inch, loops, additional compressor hp at Swift Current, and Indian Head, Saskatchewan, and Portage la Prairie, Manitoba, $45 million, planned.

268 miles, 34-inch, loops, and additional hp planned for 1961, $69 million.

122 miles, 34-inch, loops, hp additions, $46 million, planned for 1962.

Trans-Prairie Pipelines, Ltd., Edmonton, crude line, from Weyburn field to Regina-Moose Jaw areas, $5 million, considered.

Westcoast Transmission Company, Ltd., 250 miles, 30-inch, gas, Taylor to Fort Nelson, B. C., planned.

Williams-McWilliams Industries, Inc., New York, 441 miles, 6-inch, crude, Villa Montes, Bolivia to Villa Hayes, Paraguay, considered.

Yacimientos Petroliferos Fiscales, Buenos Aires, Argentina, 621 miles, 12-inch, products, Mendoza to San Lorenzo, Argentina, $19 million, planned.

450 miles, 16-inch, crude, from Neuquen Province to Bahia Blanca, planned.

ON THE LINE

ASCE New Orleans Meeting

The American Society of Civil Engineers will center national convention program around civil engineering problems about water, its control and drainage. Over 1,500 engineers are expected for the March 7-11 meeting at the Jung Hotel, New Orleans.

The Waterways & Harbors Division of the Society is sponsoring two sessions at which eight papers will be presented; it will also co-sponsor sessions with Construction Division where 11 papers will be offered. Three sessions of Hydraulic Division will be devoted to flood control.

In other areas, Construction and Pipeline Divisions will each present seven papers, Structural Division will present 13 technical papers and Soil Mechanic & Foundations Division 10 papers.

Seven field trips are planned and a special student-day program has been arranged for Tuesday, March 8.

Roy T. Sessums of New Orleans, is general chairman of the convention.

Tennessee Gas Expanding Offices

Tennessee Gas Transmission Company plans expanding activities with a new South Louisiana headquarters in Lafayette, La.

A new building will be constructed on the company's recently purchased plot in the Lafayette oil center. Offices will include Tennessee Gas Pipeline Company, Bay Petroleum Company and Tennessee Gas and Oil Company personnel.

Tennessee Gas Pipeline now has pipe line operating division headquarters for the southern Louisiana-Mississippi area in Houma, La. This office will be moved to Lafayette.

Just for the Record

More conscious of 'payola' tunes in the business world, businessmen are becoming more conservative in their gift spending, says a report from The Business Goodwill Advisory Council.

Although up in spending from $253 million to $300 million, the average cost of a 1959 business gift was about $7.50, while average five years ago ran $14.

"Extravagant business gifts of the type associated with the 'payola' are on their way out, replaced with modest gifts selected with an eye toward value and good taste," according to the research organization.

Communicators Complete Course

Successful one-day seminars for communications engineers were held throughout the country by Automatic Electric Sales Corp., Northlake, Ill. Telegraph Carrier Engineering Seminars were completed by over 200 engineers representing 80 pipe line, telephone and railroad companies.

The one-day classes were conducted by Alan J. Brown, and were held in Houston, Kansas City, Mo., Minneapolis, Minn., and New York City. Course covered amplitude versus frequency modulation in telegraph carrier equipment, data and telemetering problems, equipment applications and transmission considerations.

Movie Time

A report on motion pictures about new products, advanced industrial processes and cost-saving techniques is found in a new revised edition of the "Business & Professional Film Catalog," published by Modern Talking Picture Service.

The films, 16-mm-sound, 15 to 30 minutes in length, are available on free loan to technical groups, universities, business and professional audiences.

Copies of catalog may be obtained by writing Modern Talking Picture Service, 3 East 54th Street, New York 22, N. Y.

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ROLLER BEARING CASING INSULATOR

(Patent Pending)

NEW

UNIQUE EXCLUSIVE

When You Use Greenhead Roller Bearing Casing Insulators, you get:

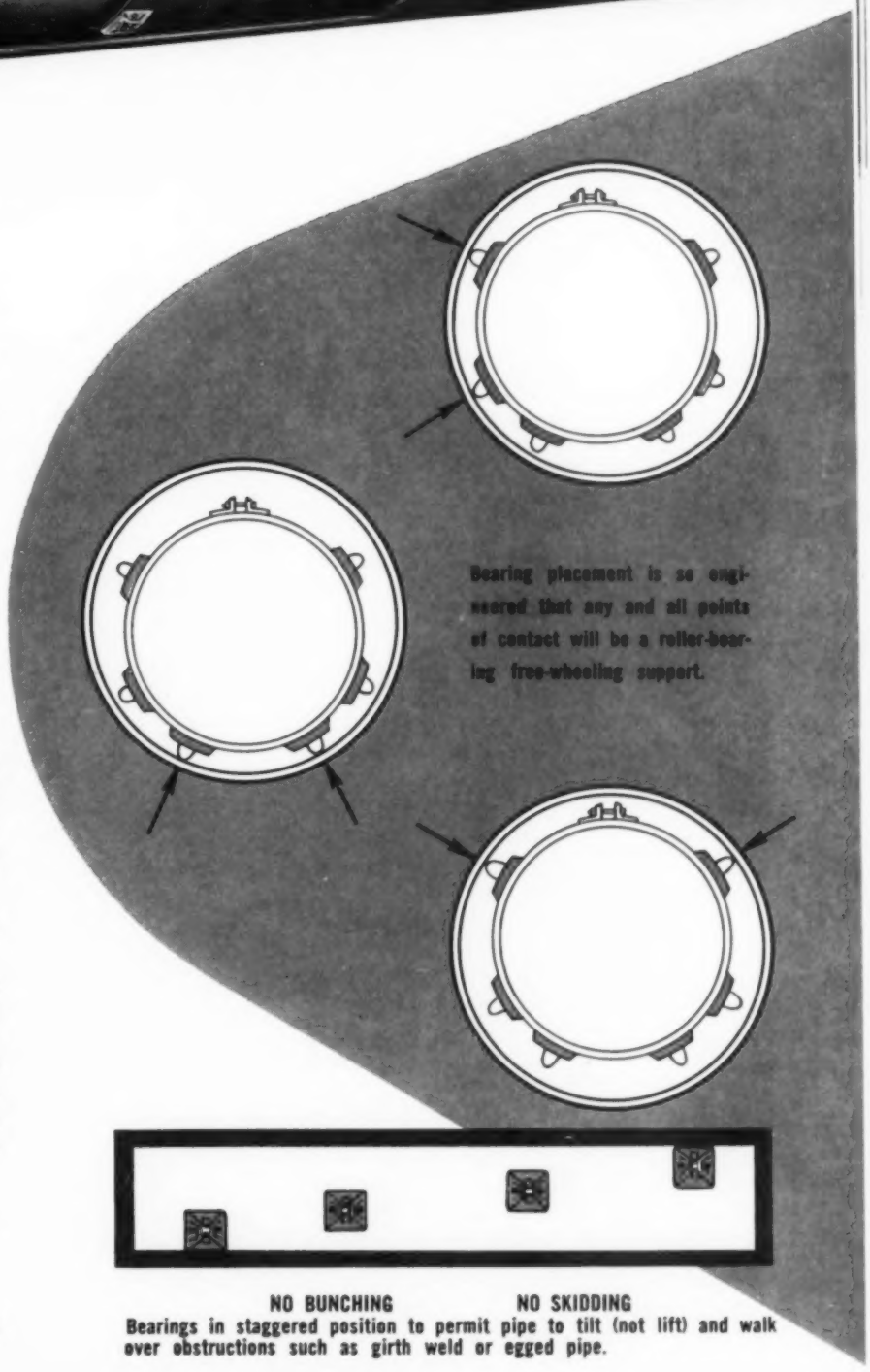
- **Double Insulation —**
  - Non-conductive plastic bearing housings
  - Specially fabricated mastic insulation, fiber filled to prevent cold flow
- **Faster, Smoother Movement of Carrier Pipe Through Casing —**
  - Staggered roller bearings "walk" pipe over obstructions
  - Smoother movement into casing
  - No damage to pipe coating
  - No skidding; no bunching of rollers
- **Competitive Costs**

Road crossings are speeded up by rolling the line through the casing on the Greenhead Roller Bearing Casing Insulator.

Multiple bearings mounted in non-conductive plastic bearing housings are arranged in echelon on a steel band, which is backed with a tough mastic gasket of high dielectric properties. Although the band is held in place by flange bolts, drag friction has been reduced to a point that the carrier line has been pushed by hand through the casing with the insulator *unbolted.*

The staggered arrangement means that no two bearings hit an obstruction, such as girth weld or egged pipe at the same time. This pattern rolls the pipe to the opposite side where other bearings assume weight and the pipe walks over the obstruction without having to lift the complete line weight.

Demonstrations and prices furnished on request.



NO BUNCHING **NO SKIDDING**

Bearings in staggered position to permit pipe to tilt (not lift) and walk over obstructions such as girth weld or egged pipe.

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Rules of Thumb

and Engineering Data Sheets
for the Pipeliner's field notebook

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These practical aids give quick, reasonably accurate answers to design, maintenance and cost estimating problems. PIPE LINE INDUSTRY will pay $25 for each chart, nomograph or data sheet published—$15 for each Rule of Thumb. Send your ideas to PIPE LINE INDUSTRY, P. O. Box 2608, Houston, Texas

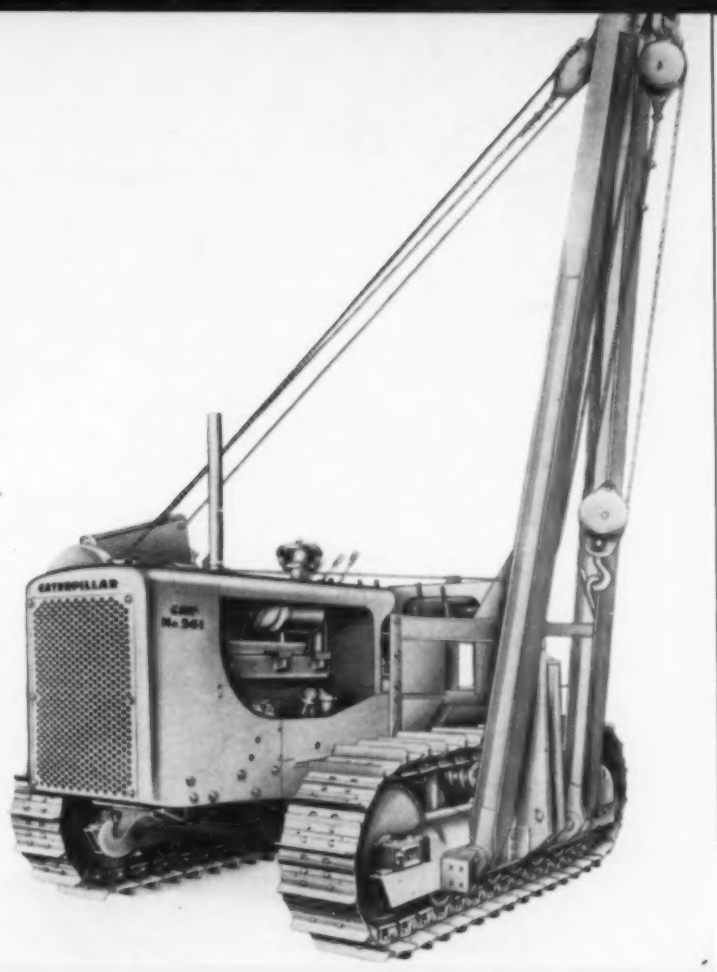
Engineering Design —73—How to measure sheet steel, steel wire and copper wire by gage

Here are the gage measurements most used in the United States today. Thin sheet steel is measured by the Manufacturers' Standard Gage for Sheet Steel. Steel Wire is usually measured by the U. S. Steel Wire Gage, and Copper Wire—electrical is measured by the Brown and Sharpe Gage. However, in the latter case, wire larger than 4/0's is usually measured in circular mils.

	Manufacturers' Standard Gage for Sheet Steel		Steel Wire Gage	Copper Wire
Gage No.	Sheet Thickness In Inches	Weight in Pounds Per Square Foot	Steel Wire (U.S. Steel Wire Gage)	Brown & Sharpe Gage for Copper Wire
7/0's	.....	.....	0.4900	.....
6/0's	.....	.....	0.4615	0.5800
5/0's	.....	.....	0.4305	0.5165
4/0's	.....	.....	0.3938	0.4600
3/0's	.....	.....	0.3625	0.4096
2/0's	.....	.....	0.3310	0.3648
0	.....	.....	0.3065	0.3249
1	.....	.....	0.2830	0.2893
2	.....	.....	0.2625	0.2576
3	0.2391	10.0000	0.2437	0.2294
4	0.2242	9.3750	0.2253	0.2043
5	0.2092	8.7500	0.2070	0.1819
6	0.1943	8.1250	0.1920	0.1620
7	0.1793	7.5000	0.1770	0.1443
8	0.1644	6.8750	0.1620	0.1285
9	0.1495	6.2500	0.1483	0.1144
10	0.1345	5.6250	0.1350	0.1019
11	0.1196	5.0000	0.1205	0.0907
12	0.1046	4.3750	0.1055	0.0808
13	0.0897	3.7500	0.0915	0.0720
14	0.0747	3.1250	0.0800	0.0641
15	0.0673	2.8125	0.0720	0.0571
16	0.0598	2.5000	0.0625	0.0508
17	0.0538	2.2500	0.0540	0.0453
18	0.0478	2.0000	0.0475	0.0403
19	0.0418	1.7500	0.0410	0.0359
20	0.0359	1.5000	0.0348	0.0320
21	0.0329	1.3750	0.0317	0.0285
22	0.0299	1.2500	0.0286	0.0253
23	0.0269	1.1250	0.0258	0.0226
24	0.0239	1.0000	0.0230	0.0201
25	0.0209	0.8750	0.0204	0.0179
26	0.0179	0.7500	0.0181	0.0159
27	0.0164	0.6875	0.0173	0.0142
28	0.0149	0.6250	0.0162	0.0126
29	0.0135	0.5625	0.0150	0.0113
30	0.0120	0.5000	0.0140	0.0100
31	0.0105	0.4375	0.0132	0.0089
32	0.0097	0.4062	0.0128	0.0080
33	0.0090	0.3750	0.0118	0.0071
34	0.0082	0.3438	0.0104	0.0063
35	0.0075	0.3125	0.0095	0.0056
36	0.0067	0.2812	0.0090	0.0050
37	0.0064	0.2656	0.0085	0.0045
38	0.0060	0.2500	0.0080	0.0040

FAST FACTS ON THE No. 561 SERIES B
—a medium-sized rig with big production features!

38,800-lb. lift with hydraulically adjustable 5,000-lb. counterweights (optional)—two other stationary counterweight arrangements available in 2,500-lb. and 3,500-lb. groups • 93 HP • Direct drive with exclusive Caterpillar oil clutch • Heavy 15' boom (12½' and 18' booms optional) • 3-speed lift, 1-speed lower winch transmission • Fast, convenient controls that are easy to reach and easy to operate with safety engineered into every motion • 10½" ground clearance • 74" gauge tracks • Heavy-duty lifetime lubricated undercarriage.



Caterpillar announces the new No. 561 Series B Pipelayer

93 HP • 38,800-lb. lift

Here's an all-new medium-sized pipelayer with the features, power and range of lifting capacities to handle a multitude of jobs easier and faster on your spread. Built with all the quality and stamina of the giants of the Cat pipelayer line, it is designed to keep working profitably for you over the roughest ground and most abrasive soils.

Here are some reasons why. Its new Cat Diesel Engine delivers high torque at low speeds, long life under full loads. Its heavy-duty undercarriage features lifetime lubricated track rollers and idlers that never need on-the-job servicing and hydraulic track adjusters that permit track adjustment with the easy stroke of a grease gun. And its oil clutch is built to operate a long, hard season without adjustment.

These and many other features are listed briefly. Look them over. But for the full story, see your Caterpillar Dealer. Get the complete facts about the all-new No. 561 from him. Ask him to demonstrate. See for yourself how you can use it in your spread on a wide range of jobs.

Caterpillar Tractor Co., General Offices, Peoria, Illinois, U. S. A.

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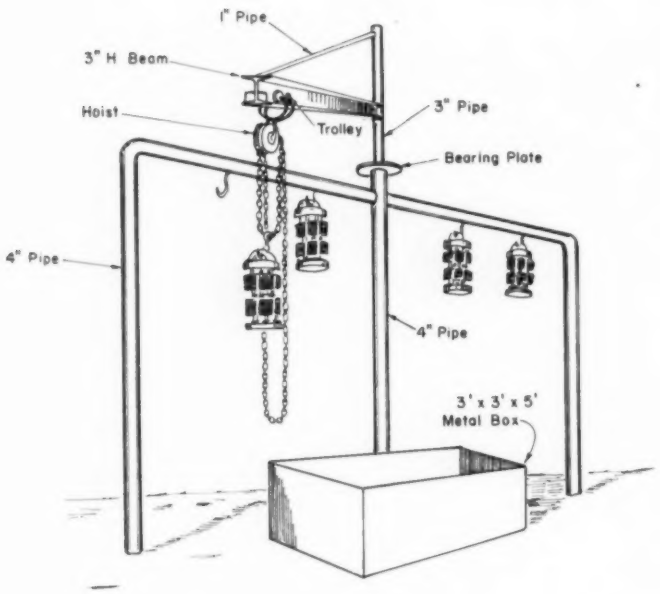
HEAVY-DUTY PIPELAYERS FOR THE HARD WORK

How to do it

PIPE LINE HINTS

$10 is paid for each illustrated acceptable contribution. Mail to The Editor, PIPE LINE INDUSTRY, P. O. Box 2608, Houston 1, Texas

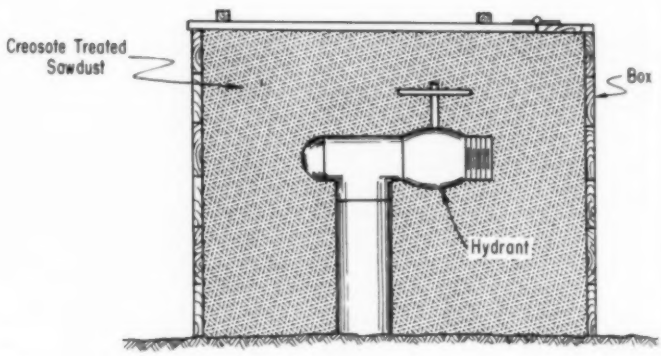


Construct Hoist to Unload Clean and Store Scrapers

Construct a hoist similar to the one shown in the accompanying drawing and use it to unload scrapers from trucks, for dunking them in boiling water or solvent and for hanging them on a storage rack.

Note that the upright pipe stanchion is 4-inch, with a piece of 3-inch inside it. The latter has a circular piece of ½-inch plate welded to it to serve as a bearing plate.

The H-beam supports a trolley which in turn supports the hoist. The storage rack made of 3 or 4-inch pipe is welded to the 4-inch stanchion.



Winterize Necessary Fire Fighting Equipment

Better take a second look at your fire-fighting equipment. Will it weather the freezing temperatures ahead?

If the fire hydrants are the self-draining kind, you have no worry unless they fail to drain (or fail to drain fast enough) after use. If they are the kind that stay filled with water, the best solution is to build a box around them; fill the box with creosote-treated sawdust or manure. The box can be easily ripped off the plug if it's needed.

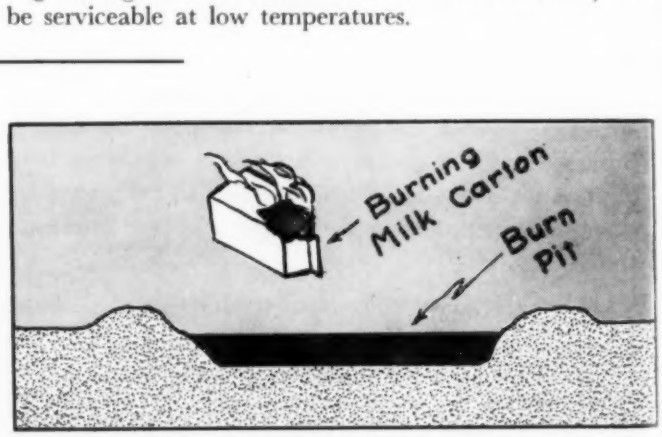
If you have fire barrels which must stay filled with water—simply add calcium chloride to lower the freezing point. Five pounds will lower the freezing temperature of two gallons of water to 10° F and each additional pound will lower the freezing point about 10° F.

As an added precaution, you'd better try out all fire extinguishers at low temperatures or at least check the engineering data to determine whether or not they will be serviceable at low temperatures.

Use Empty Milk Carton When Igniting Burn Pit

Lighting off a burn pit seems simple until you do it yourself. Where you pour gasoline on the pit to start the crude burning, you have the problem of trying to light it off without (1) catching your own clothing on fire, (2) lighting off something besides the burn pit and (3) missing the target and having to start over.

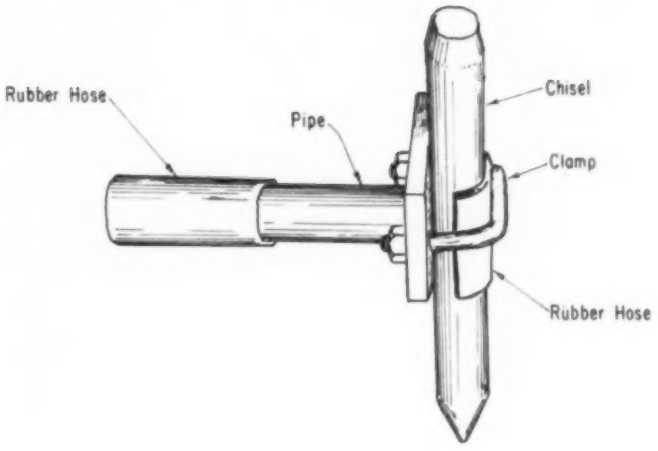
One solution to the problem is to place a little dirt in the bottom of an old milk carton—the kind with paraffin on it—lighting the top and tossing it in the pit. The dirt in the bottom gives the carton enough heft to make it easy to throw. At the same time it keeps the carton floating erect in the oil until ignition takes place. Advantages of the waxed cartons—they are not easily extinguished and have a long burn-life.



Fabricate a Clamp for Cold Chisels and Improve Safety

Two identical injuries occurred 15 minutes apart on a compressor station job. A flying fragment from one chisel cut a large blood vessel in a workman's forearm and before he could be carried to a doctor, another man sustained an almost identical injury.

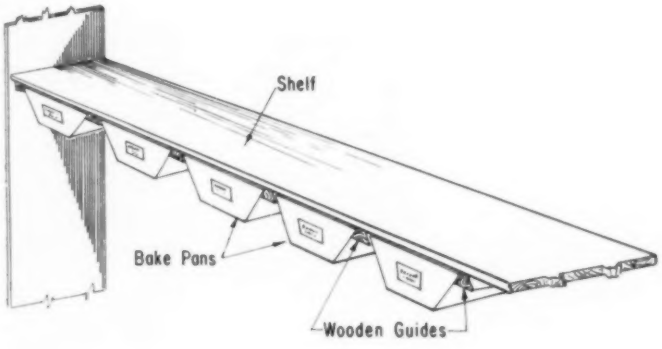
Check up on injuries, and you'll find cold chisels are dangerous for several reasons. First, the tool steel is somewhat brittle, and when the upper end is allowed to mushroom, you have the set-up for injuries. Second, the chisel is used in most instances to cut metals—often from awkward positions. It takes strong blows with a heavy hammer to do the job, and this endangers the workman who is holding the chisel. One solution to this problem is to fabricate light holders for the chisels; this, at least, will remove the fingers and hand from the most dangerous area. Fabricate the handle as shown, using a short length of ¾-inch pipe welded to a wire-rope clamp. Cover the handle with rubber hose and bolt it to the chisel with the clamp.



Convert Bake Pans Into Containers for Small Parts

Bake-pans—the kind you use for home-made bread—make excellent containers for small parts in the station or pipe line warehouse. Moreover, they fit up under shelves, taking up space that otherwise would go to waste.

The galvanized pans are readily available at most hardware stores and a skill-saw will make short work of the guides which support the pans from above. To simplify warehouse procedures, each pan should be labeled with the contents and perhaps a running inventory of the number on hand.



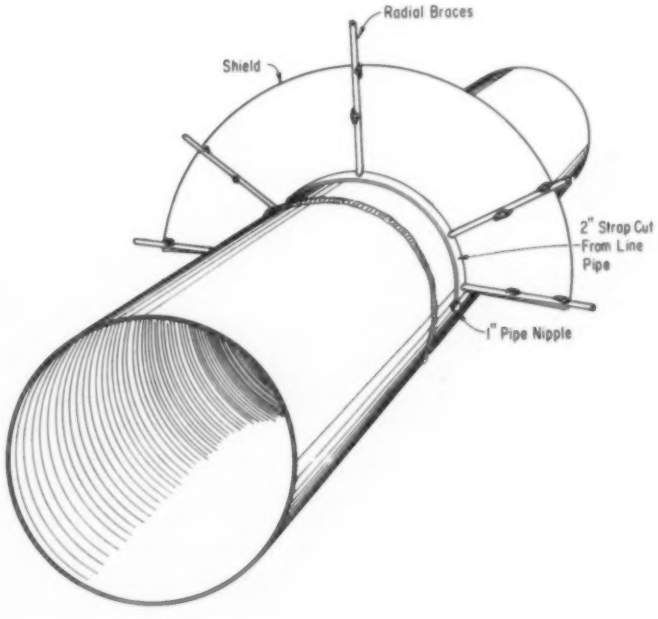
Steel Shield Solves Weld Problems on Windy Spread

Two things used to shut the welders down—fast! Three drops of water could fall in a 12-foot circle—and it was raining! A fairly brisk wind could blow—and the welds suffered as the arc was blown.

A solution to one of these problems is shown here. This light metal shield will protect the welding arc during fairly high winds—provided the direction is not at right angles to the pipe. This shield is made of strap steel and light gage sheet.

Cut a 2-inch-wide strap from the line pipe. Cut the strap to two thirds the circumference, and weld a 1-inch nipple to each end to serve as a guide and to protect the pipe as the shield is slipped over the pipe. Next, weld five radial braces to the strap that goes around the pipe and tack the sheet metal to them as shown.

A welder's helper can easily handle this shield; there are times when it can be almost as important as any piece of equipment on the spread.



For More Dependable Equipment and Service

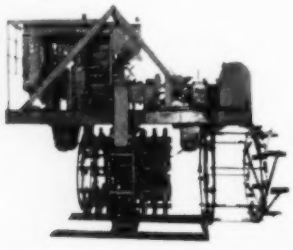
Specify

MYOCO

CLEANING and PRIMING MACHINE

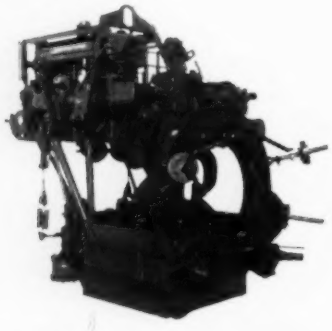
The MYOCO Cleaning and Priming Machines are available in sizes 3" thru 36". Pictured here is the 26"-32" size with two counter-rotating heads featuring the special MYOCO design counter-rotating gear box.

It is powered by an International U-9 self-starting engine and uses the Ramsey transmission. Engine exhaust is utilized to heat primer tank.



COATING and WRAPPING MACHINE

The MYOCO Coating and Wrapping Machine is powered by an International gasoline engine, with electric starter, spray type shoes, and heavy-duty transmissions and clutches. This new machine features under-pressure-crawler wheels equipped with hydraulic cylinder to maintain positive contact, easily controlled by the operator.



When you use MYOCO pipeline equipment, you quickly find that servicemen are experienced and available twenty-four hours a day with fast transportation available to serve you in any way; efficient equipment operation is assured by periodical checks; and if possible, parts and supplies are shipped the same day ordered.

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What's Happening among MEN in the INDUSTRY

Shell Pipe Line Corporation announces that **J. A. Horner** has assumed the presidency succeeding **Joe T. Dickerson,** who retired January 1. Dickerson had been with the company 33 years.

J. A. Horner

Horner formerly was secretary of **Shell Oil Company.** He joined the firm in 1936 as a member of the Legal Department. In 1944 he was named a member of the group which planned the company's postwar expansion. He became administrative assistant in the office of Shell Oil Company president in 1945 and in 1949 was appointed assistant secretary. He was promoted to secretary in 1953.

He also had served as vice president of Shell Development Company and secretary of Shell Chemical Corporation, International Lubricants Corporation and Shell Canadian Exploration Company.

Transwestern Pipeline Company announces appointment of four men in key positions. **Paul F. McBride** has been named operations manager; **William A. Koros** becomes controller and assistant treasurer and secretary; **Ben A. Copass, Jr.,** has been appointed manager of gas purchase contracts, and **Leslie M. Fisher** has been named superintendent of the Puckett gas purification plant at Fort Stockton, Texas.

McBride had been general superintendent of operations for Pacific Northwest Pipeline Corporation since 1958. He had been chief engineer since 1956. Koros had been assistant to the vice president, Rate Department, of Charleston Group Companies of Columbia Gas System since June 1959. Previously, he had been a field examiner in Bureau of Rates of the FPC.

Copass had been with Humble Oil & Refining Company since 1947. He represented the Gas Department in FPC matters for four years. Recently he had been sales representative in Humble's Marketing Department, handling purchases and sales of liquid gas plant products. Fisher has previously been plant superintendent of the Carthage Corporation processing plant and assistant district superintendent.

Marathon Pipe Line Company is undergoing realignment of its operating divisions. The company renamed three of its divisions and created the Southwestern Region.

The Martinsville, Ill., division is now the Great Lakes Region with **K. E. Tappy** as manager. The Bridgeport, Ill., division is now the Tri-State Region with **E. S. Mardis** as manager. The Wyoming division becomes the Rocky Mountain Region with headquarters at Casper, Wyo. **M. L. Stanfield** is manager and **M. E. Parker** is assistant manager.

The Southwestern Region includes pipe line operations in New Mexico, Texas, Louisiana and Mississippi. **S. A. Click** is manager with headquarters in Houston.

Pacific Lighting Gas Supply Co. announces the promotions of **W. D. Morningstar** as assistant vice president and assistant treasurer, and **J. R. Elliott** as secretary.

Elliott joined the company in 1954 as an attorney. He was named assistant secretary and assistant counsel and assistant secretary in 1955. Morningstar has been with the company since 1951 when he was appointed an administrative aid. He has been auditor of SLGS since 1954.

Wm. T. Eskew, Jr.

Byron K. Smith

Southern Pacific Pipe Lines, Inc., announces several personnel appointments. **Byron K. Smith,** formerly assistant general manager, becomes assistant to the president with headquarters in San Francisco.

William T. Eskew, Jr., succeeds Smith as assistant general manager at Los Angeles. **Robert R. McDaniel** was promoted from Northern District field superintendent to chief engineer at Los Angeles. **Charles B. Miller,** formerly assistant to general manager, Los Angeles, becomes field superintendent at Roseville, Calif. **Maurice A. Huso,** former electrical engineer, Los Angeles, succeeds Miller and **John M. Goss** becomes electrical engineer at Los Angeles. **Murray A. Levy** was promoted from superintendent of products movement to manager of products movement at Los Angeles. All seven men have been with the company since its formation in 1955.

General Petroleum Corporation's Marine Department will become the West Coast Division of the Marine Transportation Department of **Socony Mobil Oil Company, Inc. H. C. Ellis,** manager of the Marine Department, becomes manager of the new division. Division will maintain location at Terminal Island, Calif.

J. G. Yoder

H. F. Swindle

J. G. Yoder has been appointed purchasing agent for **Great Lakes Pipe Line Company,** succeeding **H. F. Swindle** who retired. Yoder has been assistant purchasing agent since 1947. Swindle served as purchasing agent since the company was organized in 1930. He began his career in the oil industry in Oklahoma in 1919.

A. W. Levan has been elected secretary and a member of the board of directors for **Cities Service Gas Company. W. R. Morton** retired as secretary and director after 50 years of service with the company.

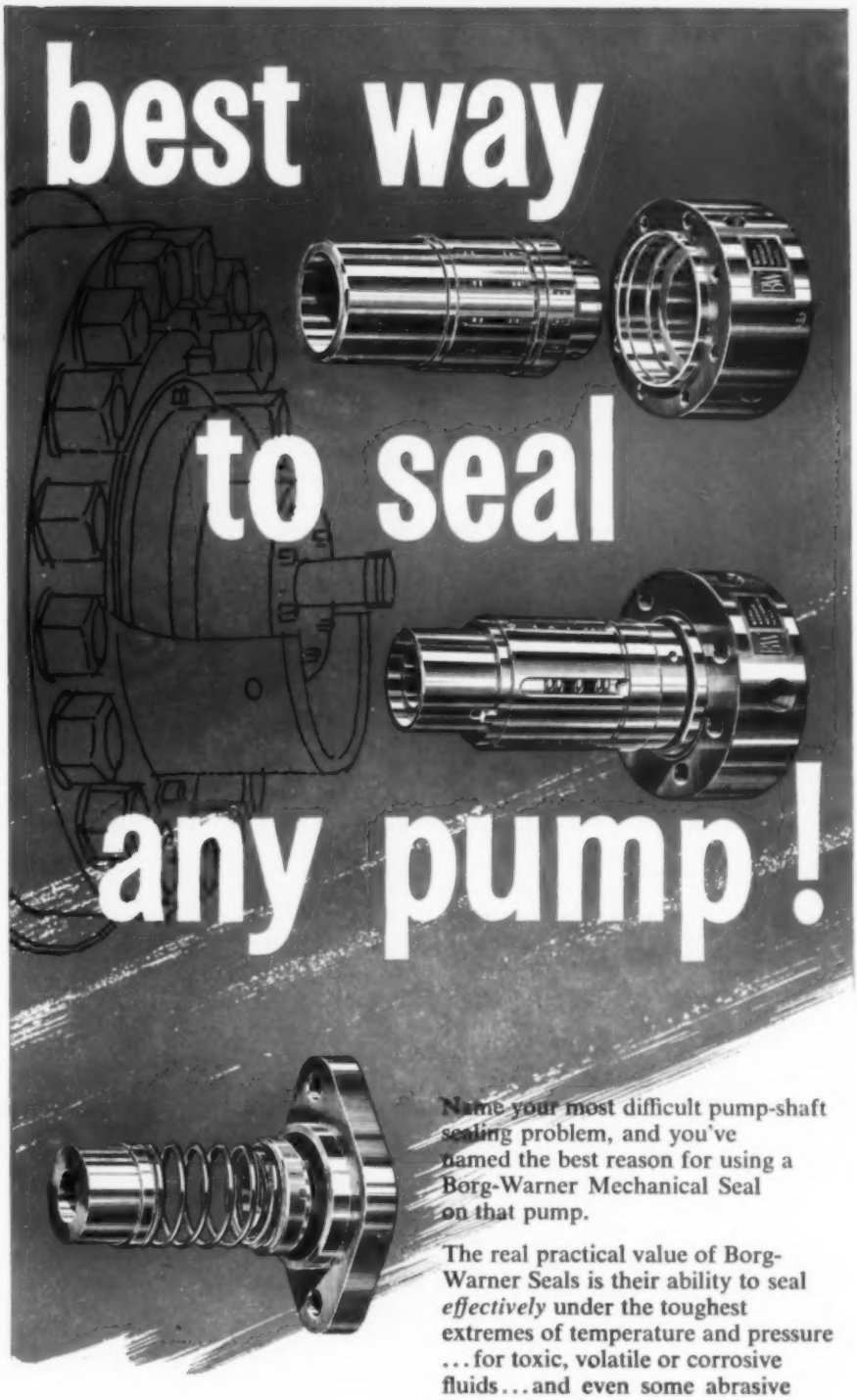
Levan joined Cities Service in 1920 and in 1939 he became supervisor of auditing operations. He was named assistant secretary of the company in 1947. Morton began his career with a Cities Service affiliate, Knoxville Gas Company, in 1909. From 1924 until 1939, he was chief accountant for the Empire Companies. Since 1939, he had been directly associated with Cities Service and in 1944 was promoted to secretary.

The **American Right of Way Association** Gulf States Chapter No. 8 has elected officers for 1960. **Glenn P. Thompson, Tennessee Gas Pipeline Company,** was elected president. **William H. Huffman, Humble Pipe Line Company,** was named secretary. Newly selected vice presidents include **Dan Williamson, Transcontinental Gas Pipe Line Corporation; J. M. DeBardelebed,** Bureau of Public Roads; **Kenneth E. Moreland, El Paso Natural Gas Company; T. E. O'Neill, Shell Pipe Line Corporation,** and **L. V. Dennis, Interstate Oil Pipe Line Company.**

G. P. Thompson

John H. Osborne has been named assistant to the vice president at Macungie, Pa., and **Charles Oleksa** has been made chief dispatcher, Eastern Products Division, succeeding Osborne, for **Buckeye Pipe Line Company.** Osborne has been with Buckeye since 1952.

The **American Gas Association** has named **Bernard Kaapcke** editor of the association's monthly publication. He replaces **Walter H. Dyer,** who has joined public relations staff of D'Arcy Advertising Co. Kaapcke had been special feature editor on the AGA Monthly for the past three years.



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Ken H. Ault has joined **Trunkline Gas Company** as district production engineer in the Lafayette, La., office. Formerly he had been associated with Forest Oil Company.

Earl E. Mayo, vice president of **Southern Pacific Pipe Lines, Inc.,** has retired after almost 53 years service with the railroad and pipe line company. Mayo became chief engineer of the Pacific Lines in 1944, and was made vice president in 1955.

He began his career with **Pacific Railway and Navigation Company,** now part of Southern Pacific, in 1907. Prior to his retirement, he was in charge of many of Southern Pacific's major construction projects.

DEATHS

A. L. Burns, 64, president of Gulf Printing Company and formerly vice president and general manager of Gulf Publishing Company, was killed in an airplane accident near Eagle Lake, Texas, December 31. He joined Gulf Publishing Company in 1920.

William G. Heltzel, 64, pipe line consulting engineer, died Dec. 3. He was a former operating vice-president of Stanolind Pipe Line Co.

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BOOKS

API Accident-Prevention Manual No. 13A, American Petroleum Institute, 1271 Avenue of the Americas, New York 20, $1.

The American Petroleum Institute has issued its third edition of the accident-prevention manual 13A, "Cleaning Mobile Tanks Used for Transportation of Flammable Liquids, Section A—Tank Vehicles."

The 11-page publication explains the procedure for preparing tank units for repair and tank compartments for gas freezing, methods of gas-freezing tanks and precautionary measures for hot work and repair operations. The manual was prepared by the API subcommittee on Tanks.

"Noise Abatement at Gas Pipeline Installations—Physiological, Psycological, and Legal Aspects of Noise," American Gas Association, 420 Lexington Ave., New York 17, $1.50.

Results of an intensive literature survey of gas pipe line noise abatement are reported by the American Gas Association's Pipeline Research Committee in the first volume of a new three-part handbook.

The 58-page booklet provides the gas industry with an introduction to the physiological, psychological and legal aspects of noise at pipe line installations. To be published in 1960, Volumes 2 and 3 will cover field aspects of the research program.

History of Humble Oil Company, by Henrietta M. Larson and Kenneth Wiggins, Porter, Harper & Brothers, 49 East 33D St., New York 16.

The story of Humble Oil Company traces the efforts by the company's administrators and employes to carry on the producing, transporting, and refining crude oil and selling crude and products. The history shows how a growing company undergoing rapid technological change in a highly competitive industry has adapted its personnel, concepts and techniques to meet new problems and opportunities.

Illustrated with 32 pages of photographs and 20 maps and charts, the book covers a period of a little over 40 years. Henrietta Larson is associate professor of business history at the Harvard Business School, and Kenneth Wiggins Porter is professor of history at the University of Oregon.

How to Invent, The Gulf Publishing Company, P. O. Box 2608, Houston 1, Texas, by Forrest E. Gilmore, Price $2.50.

Extensive research indicates that with proper training the creativity of this country's scientists and technologists can be increased at least eight times.

This book provides a guide to mental techniques of learning to invent . . . and their application to daily thinking. According to the author: ". . . just because you have never invented anything does not mean you have no talent for it." He points out that there is no easy or magical way to become an inventor.

In addition to the interesting coverage of best ways to prepare for invention, the book provides the reader with a detailed discussion of patent practices he should know such as: how to decide what is patentable, how to go about obtaining a patent, what a patent really means, how to protect your patent from the beginning.

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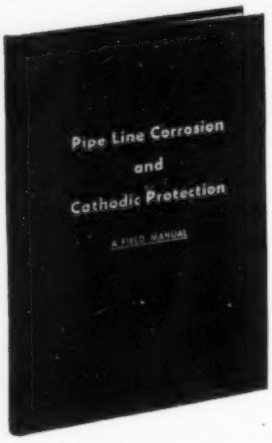

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WHO'S MEETING WHERE

February

NACE, Short course, Mayo Hotel, Tulsa, Feb. 24-26.

Pipe Line Contractors Association of Canada, annual meeting, Empress Hotel, Victoria, B.C., Feb. 25-27.

NGAA, Permian Basin Regional meeting, Lincoln Hotel, Odessa, Texas, Feb. 26.

AGA, general management section conference, Pittsburgh-Hilton Hotel, Pittsburgh, Feb. 29-March 2.

March

ASME, Gas Turbine Power Division, fifth annual gas turbine conference and exposition, Rice Hotel, Houston, March 6-9.

ASCE, national convention, Jung Hotel, New Orleans, March 7-11.

NACE, 16th annual conference, Dallas Memorial Auditorium, Dallas, March 14-18.

NGAA, Oklahoma Regional meeting, Biltmore Hotel, Oklahoma City, March 18.

Mid-West Gas Association, annual meeting, Hotel St. Paul, St. Paul, Minn., March 21-23.

New England Gas Association, annual meeting, Statler Hotel, Boston, March 24-25.

Oklahoma Utilities Association, annual convention, Biltmore Hotel, Oklahoma City, March 24-25.

April

Florida-Georgia Gas Association convention, Biltmore Hotel, Palm Beach, Fla., April 8-9.

PIEA-PESA, thirty-second annual petroleum industry conference and exhibition, Hotel Muehlebach and Municipal Auditorium, Kansas City, Mo., April 12-14.

Southwestern Gas Measurement Short Course, Drill Hall, North Campus, University of Oklahoma, April 19-21.

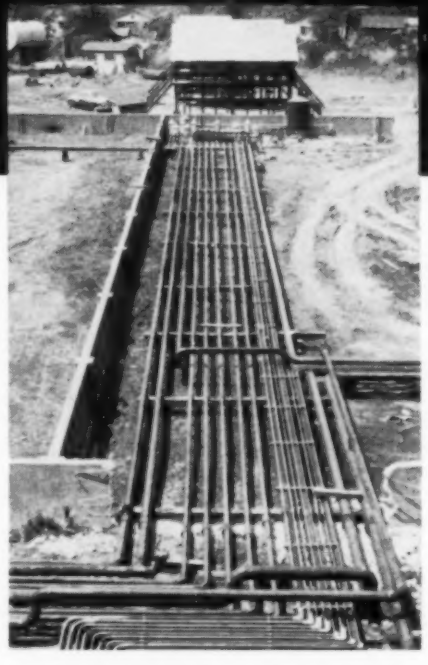
Indiana Gas Association, French Lick-Sheraton Hotel, French Lick, Ind., April 20-22.

Southern Gas Association, annual meeting, Galveston, Texas, April 25-27.

ASME Metals Engineering Division—AWS conference, Chase-Park Plaza, St. Louis, April 25-29.

American Welding Society, 41st annual meeting and exposition, Los Angeles, April 25-29.

QUALITY PIPELINES



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NGAA, annual convention, Rice Hotel, Houston, April 27-29.

API, Division of Transportation, pipe line conference, Mayo Hotel, Tulsa, April 28-29.

May

AGA Operating Section, joint distribution and transmission conference, Roosevelt and Jung Hotels, New Orleans, May 9-13.

American Society for Metals, southwestern metal congress and exposition, Dallas, May 9-13.

Instrument Society of America, power instrumentation symposium, San Francisco, May 9-11.

ASME, oil and gas power conference and exhibit, Muehlebach Hotel, Kansas City, Mo., May 22-26.

June

Appalachian Underground Corrosion Short Course, West Virginia University, Morgantown, W. Va., June 1-3.

September

ASME, petroleum division meeting, Jung Hotel, New Orleans, Sept. 18-21.

AIEE, electrical conference of petroleum industry, Hotel Skirvin, Oklahoma City, Sept. 25-28.

October

NACE, northeast region conference, Prichard Hotel, Huntington, W. Va., Oct. 11-14.

NACE, south central region conference, Schroeder Hotel, Milwaukee, October 19-20.

Editorial Index Now Available

The Editorial Index is now at the printers and soon will be ready for distribution. The 1959 Editorial Index provides a time-saving entry into all 12 issues of PIPE LINE INDUSTRY published in 1959.

Bound in a handy pamphlet form, the Editorial Index lists each and every article and its author. To get a copy, write the Librarian, Gulf Publishing Company, P. O. Box 2608, Houston 1, Texas. Or, if you prefer, check the square provided on the blue Reader's Service Card at the back of this and every issue of PIPE LINE INDUSTRY.

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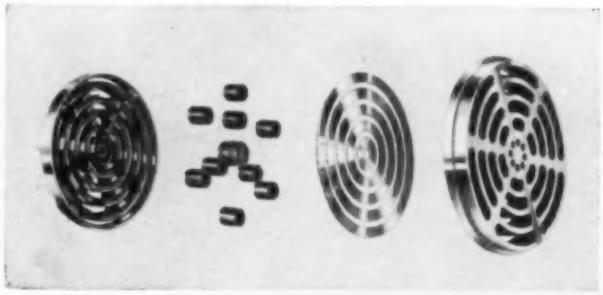

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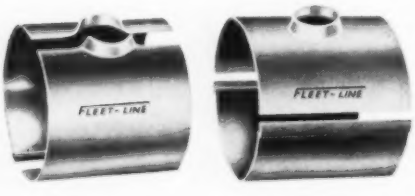

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What's Happening among SERVICE and SUPPLY MEN

B. M. Stephanus

Douglas E. Rood

Chase & Sons, Inc., Announces Three Appointments in Corrosion Division

Chase & Sons Incorporated announces several appointments in its Corr-Prev Division. Blaise M. Stephanus is director of marketing of the division. Corr-Prev Division is offering a new polyethylene tape and outerwrap corrosion protective coating. Corr-Prev emphasizes the "package" idea of supplying all components necessary for corrosion control.

Earl L. Jolly

Douglas E. Rood and Earl L. Jolly have joined the Division. Rood is Southwest Area Manager and Jolly becomes Pacific Western Area manager.

Midwest Piping Company Announces Three Promotions

Three promotions have been announced by Midwest Piping Company, Inc. Louis H. Niebling, formerly Chicago district manager, has been named general manager of Southwest Operations with headquarters in Houston. Walter J. Janesch, sales representative for Chicago area, is the new Chicago district manager. N. G. Saldana, formerly project engineer at Midwest's St. Louis office, becomes Chicago sales manager for fabrication and construction.

Schramm, Inc., Elects Five New Board of Directors

Schramm, Inc., announces the election of five executives to the board of directors. New members fill four new positions and the vacancy left by the death of Schramm President Henry N. Schramm.

Newly elected directors include Henry B. Coleman, director of materials; Charles M. Dannenberg, personnel manager; P. F. Smith, IV, dealer sales manager; George J. Stradtner, executive engineer; and Edward W. Wilson, factory manager. Harold J. Schramm has been elected president of the company. Schramm served as vice president since 1938. He has been with the company since 1932. Leslie B. Schramm was named vice president and will continue to direct sales activities. Smith succeeds Leslie B. Schramm as secretary. S. E. Smith was reappointed treasurer.

Wesley Songer Elected President of Crane Co.

Wesley A. Songer has been elected president of Crane Co. In 1959 Songer was elected executive vice president. L. H. T. Clegg, president of Crane, Ltd., of Canada, has been acting as president since April 1959. Prior to joining Crane, Songer had been with American Safety Razor Corporation. He joined A.S.R. in 1952 as vice president and general manager of operations.

International Controls Corp. Formed by Ralph P. Watkins

Ralph P. Watkins has been named president of the newly formed International Controls Corporation. The firm will have headquarters in Houston with offices at 3110 Eastside Street.

The company will manufacture automatic and remote controls for gas and liquid pipe lines. Other associates in the firm include Thomas J. Reynal, Robert L. Deutsch, Lee B. Tully, Jr., and John H. Maness.

James F. Clark

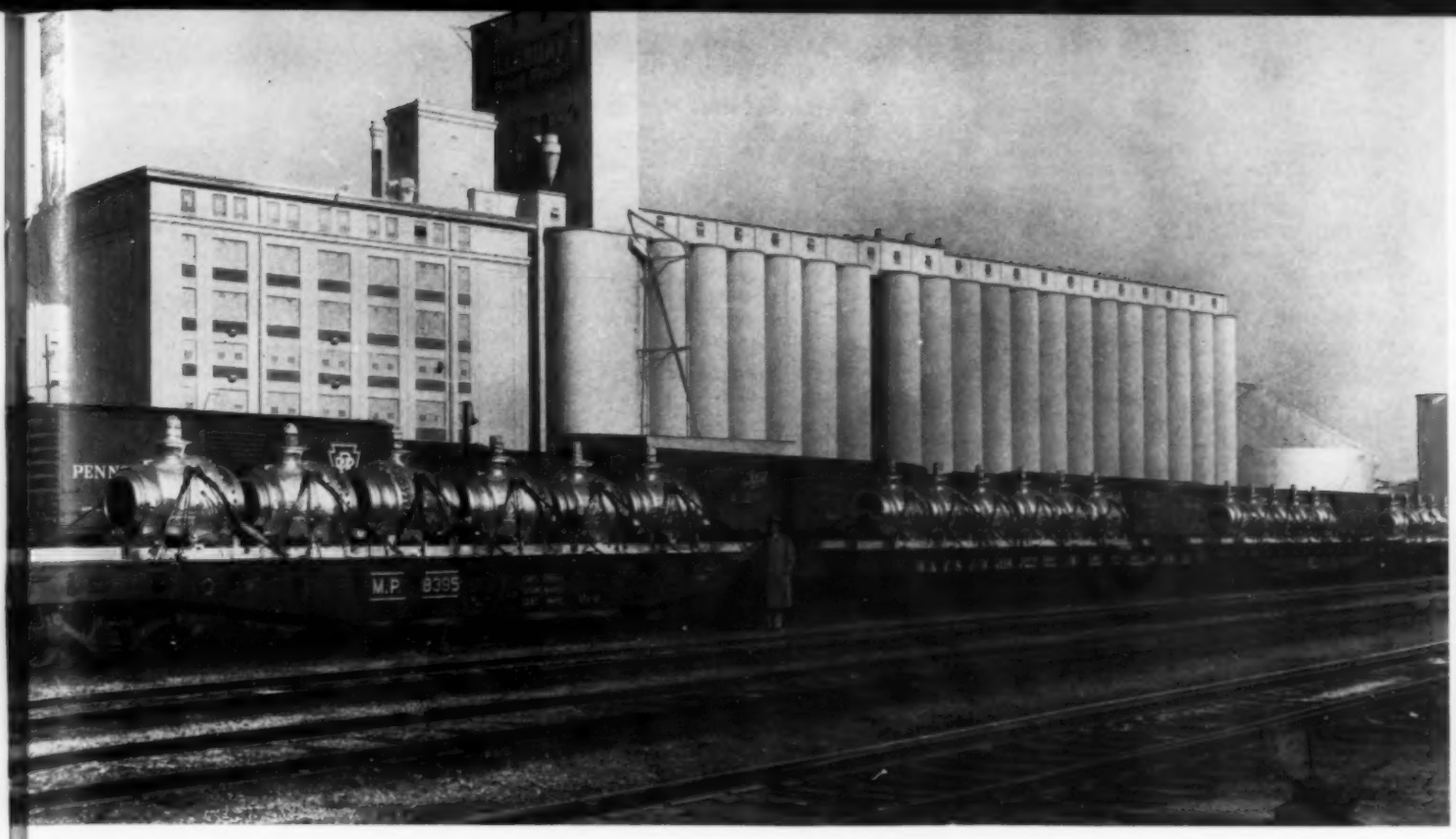
Russell C. Taylor

ACF Industries, Inc., Elects Russell C. Taylor President

Russell C. Taylor has been named president, and James F. Clark chairman of the executive committee of ACF Industries, Incorporated. Clark has been president of the firm since 1954. Taylor has been with the company for 33 years and became a vice president in 1951.

Francis H. May Promoted By Johns-Manville Fiber Glass

Francis H. May has been promoted to full responsibility for administration of Johns-Manville Fiber Glass, Inc., following the resignation of President Randolph H. Barnard. Barnard will continue to advise Johns-Manville as a consultant on



Flat carloads of Rockwell Hypresphere valves ready for shipment to a western gas transmission company.

ACCEPTANCE: BY THE TRAINLOAD

The trainload of Rockwell Hypresphere lubricated spherical plug valves (above) is dramatic evidence of the immediate acceptance of this valve by oil and gas pipeline engineers. Introduced just a little over a year ago (after three years of rugged field testing) the Hypresphere has been specified on most of the big, new pipeline jobs. Why?

The Hypresphere gives pipeline engineers all of the advantages of a lubricated plug valve (positive shut-off, easy operation, faster closure and lubricant economy) with a full round port opening. Also, the Hypresphere is far more compact than non-lubricated valves of equivalent size and pressure rating. Why not get full details plus information on the *complete* line of Rockwell-Nordstrom standard and Hypreseal lubricated plug valves. *Write: Rockwell Manufacturing Company, Pittsburgh 8, Pa. Canadian Valve Licensee: Peacock Brothers Limited; Rockwell International, S.A., Geneva, Switzerland.*

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another fine product by

ROCKWELL

Rockwell Hypresphere ready for underground installation. Note compact size for 30-inch valve.

fiber glass.

May is general manager of the Fiber Glass division. Barnard and May came to Johns-Manville in 1958 with the acquisition of L.O.F. Glass Fibers Company. May began his career with Owens-Illinois in 1940 as manager of war contracts division. He was a vice president of Glass Fibers, Inc., and was named a vice president and director of Johns-Manville Fiber Glass, Inc., in 1958.

Masonealin Instrument Department Names Leroi Webb Sales Engineer

Masonealin Instrument Department of Maintenance Engineering Corporation has appointed Leroi Webb sales engineer. He will serve the oil and gas industries in Houston and East Texas.

Two Division General Managers Appointed by Bendix Aviation Corp.

M. J. Kennedy has been appointed general manager of Bendix Filter Division, Royal Oak, Mich., and Harry Stolar becomes general manager of Marshall-Eclipse Division, Troy, N.Y., Frederic C. Weyburne, formerly general manager of both divisions, is now assistant group executive of the corporation at South Bend, Ind.

Kennedy joined Bendix in 1956 and became assistant general manager of Bendix Filter in 1957. A 26-year veteran with the company, Stolar was made assistant general manager of the Marshall-Eclipse Division in 1955.

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James M. Gloor

M. T. Wakefield

Tube Turn Names Works Manager, Announces Additional Promotions

Tube Turns Division of Chemtron Corporation named a new works manager for its main plant in Louisville, Ky., and announces several other promotions. James M. Gloor succeeds John A. Henby as works manager. He has been with the company since 1951. Morry T. Wakefield replaces Gloor as production superintendent. Formerly industrial relations director, he has been with Tube Turns since 1946. Assuming duties vacated by Wakefield, Max B. Densford becomes personnel manager. He had been wage and salary manager.

Henry H. George is chief engineer, Product Engineering and Research Department. He has been with the company since 1944. Everett C. Rodabaugh, research engineer since 1946, has been appointed head of a newly formed process research group. Named special research project head, Fred C. Smith joined Tube Turns as chief metallurgist in 1943. Arthur McCutchan, senior engineer in product engineering and research from 1947 to 1957, has rejoined Tube Turns as special projects engineer.

W. L. Somner Companies Elects New President

Ralph Abbott has been elected president of the W. L. Somner Companies, Inc., succeeding the late W. L. Somner, who died November 11. Abbott, president of Power Pumps, Inc., also has 21 years experience in the equipment business. Norman Slack was named vice president, operations; Sam Yager was selected vice president, sales; and D. I. Winters becomes vice president, Texas Operations. John A. Holwill was appointed secretary-treasurer.

Slack has been with the firm since 1948; in 1954 he became office manager and purchasing agent. Yager joined the company in 1946, and in 1954 he was named to direct oilfield sales. Winters has been associated with the company since 1947, and was appointed West Texas Division manager in 1954.

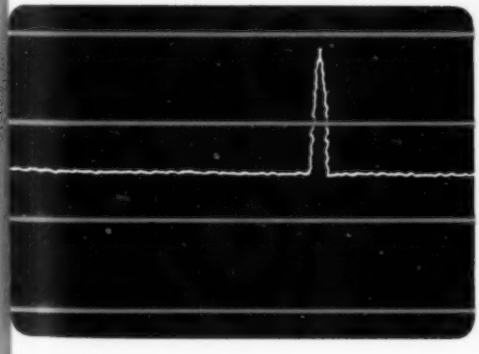
Worthington Corporation Announces Division Change

Worthington Corporation announces an organizational change in its Buffalo, N. Y., Compressor and Engine Division. The engine sales department becomes two separate groups: Power Engine Sales and Engine Compressor Sales.

Alfred M. Boehm was named manager of the power engine sales and Howard C. Barten has been appointed manager of engine compressor sales. Boehm has been with Worthington since 1924 and Barten joined the firm in 1934.

Acme-Newport Steel

PRECISION STEELMAKING CONTROL PROVIDES QUALITY IN ELECTRIC WELD LINE PIPE

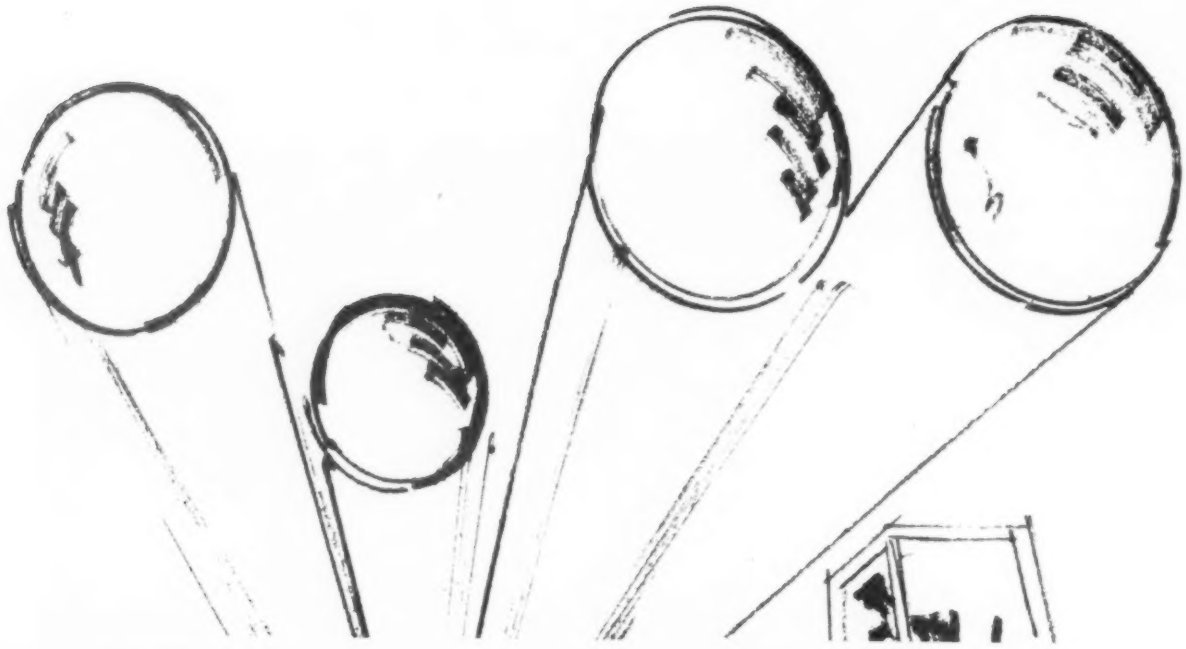


Long-lasting trouble-free quality is the goal toward which this basic steel producer continuously directs every pipe making skill and facility. Acme-Newport's complete control begins in the furnace and continues through every process. Even to final checking of finished pipe by the new electronic eye, which scans the entire surface for any imperfection that may have escaped every other safeguard. All this care in the production of electric weld line pipe makes Acme-Newport your logical source for 4″ and 6″ sizes, standard and thin wall.

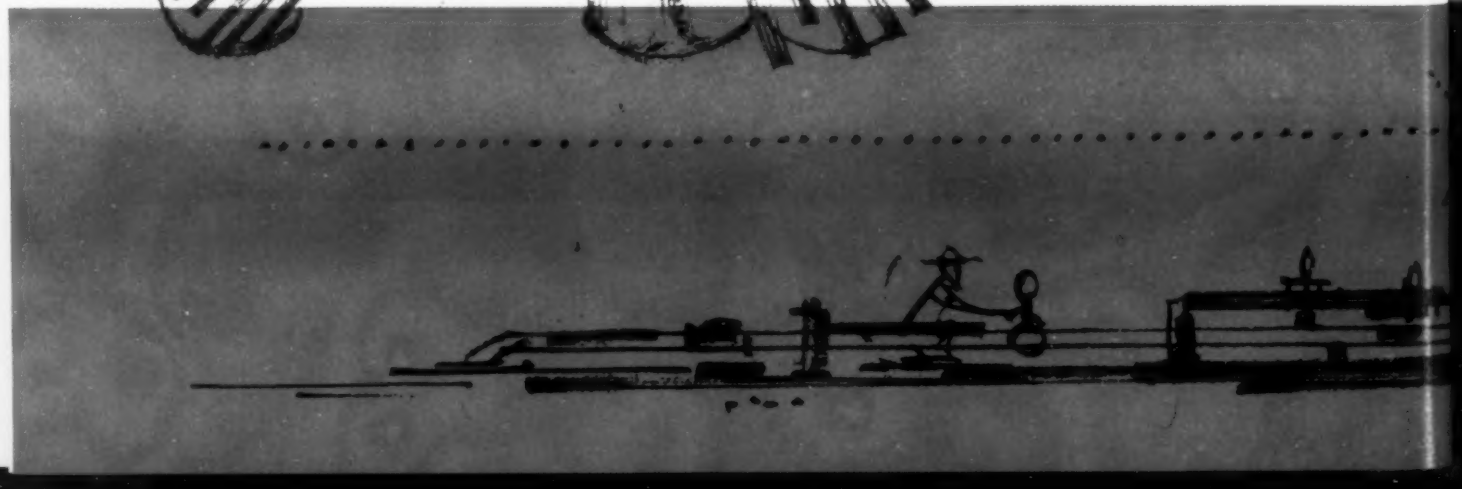
SIZES AND WEIGHTS AVAILABLE

O.D.	Wall	Wt. Per Ft.
4½	.125″	5.84
	.142″	6.61
	.156″	7.25
	.188″	8.64
	.219″	10.00
	.237″	10.79
6⅝	.156″	10.78
	.188″	12.89
	.219″	14.97
	.250″	17.02
	.280″	18.97

Acme-Newport Steel COMPANY
NEWPORT, KENTUCKY
A SUBSIDIARY OF ACME STEEL COMPANY



Wherever pipe lines go . . . .



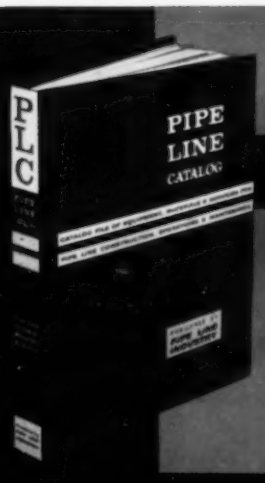
The only equipment-materials-service catalog prepared exclusively for the industry, PIPE LINE CATALOG is a library of purchasing information. Indispensable to any purchaser or specifier – operating or field executive, superintendent, foreman, engineer, purchasing agent – the catalog has data from almost 200 companies selling to the industry.

Thousands of products and services are described in this handy, one-volume, cross-indexed reference work of complete and condensed suppliers' catalogs. Finding what you want when you want it – and com-

. . . Pipe Line Catalog goes!

paring it to other products – is easy with PIPE LINE CATALOG . . . one of the biggest time and money savers in the industry.

Forget the frustrating, time-consuming chore of maintaining shelves and drawers full of suppliers' literature. PIPE LINE CATALOG makes your buying or specifying easy, convenient, efficient and economical. Use it – and save time and money.



PIPE LINE CATALOG

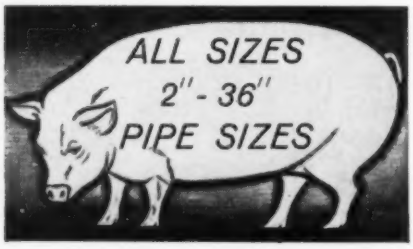
Published by PIPE LINE INDUSTRY

GULF PUBLISHING COMPANY • BOX 2608 • HOUSTON 1, TEXAS • JA 9-4301

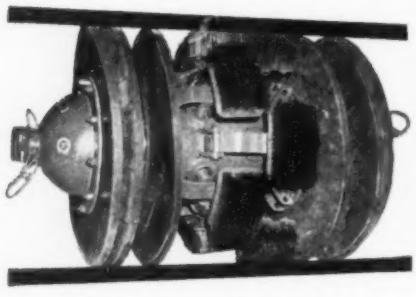
World's Largest Specialized Publisher to the Oil Industries

Branch Offices: New York, Chicago, Cleveland, Tulsa, Dallas, Los Angeles

MYOCO PIPELINE PIGS



ANY COMBINATION ALWAYS IN STOCK



MYOCO S-18 COLLAPSIBLE PIG

Especially designed for use on dual diameter lines and lines with small I. D. full opening valves within collapsible range. Sturdily built of lightweight aluminum castings with spring loaded brushes and collapsible rubber discs, the S-18 assures maximum cleaning action.

COLLAPSIBLE SIZES: 36" to 30", 30" to 24", 24" to 20" and 20" to 18".

MORRIS-YOUNG-OWENS CO.
PIPELINE EQUIPMENT AND SUPPLIES
14000 South Main Street • Houston, Texas
PArkview 3-0110
In Canada: MYOCO LIMITED, 30 Bloor St. West
Toronto 5, Ontario, Canada • Tel. WA 2-9444

A. B. Chance Company Forms New Division

A. B. Chance Company has named Alex Mackie manager of its new Petroleum Equipment Engineering and Services Division. The new division was formed to serve pipe line and production companies. In addition to sale of anchors and related products it will also offer a field engineering staff to make recommendations regarding use of products.

William M. Mooney Appointed District Manager in Houston

William M. Mooney has been named Houston district manager of the Raymond Concrete Pile Co. He has been with the company since 1941 as a superintendent. The Concrete company is a division of Raymond International, Inc.

Southern Pipe Division Appoints William I. Ballentine Chief Engineer

William I. Ballentine has been appointed chief engineer for Southern Pipe Division of U.S. Industries, Inc. He will be responsible for research and development, inspection, industrial engineering and plant engineering functions. He had been with U.S. Steel's Consolidated Western Steel Division for the past 10 years.

R. J. Phibbs

P. V. Edwards

Jones & Laughlin Announces Canadian Sales Appointments

Jones & Laughlin Supply Division announces three promotions in its Canadian sales force. P. V. Edwards, formerly district sales manager at Edmonton, becomes regional manager for Canada with headquarters at Calgary. R. J. Phibbs advances from Calgary salesman to city sales manager at Calgary. S. D. Martin has been promoted from Calgary salesman to district sales manager at Edmonton.

S. D. Martin

Edwards has been with the company since 1941 and in 1956 he was named district sales manager at Edmonton. Phibbs joined the company in 1956 and Martin has been with Jones and Laughlin since 1951.

Longhorn Supply Company Named Distributor of W-K-M Valves

Longhorn Supply Company has been named a distributor of W-K-M pressure sealing gate valves. W-K-M plans to market the valve through oil field supply stores and distributors.

MANUFACTURING SPECIALISTS IN PRESSED STEEL PRODUCTS

HACKNEY IRON & STEEL CO.

general office: ENID, OKLAHOMA
CHICAGO, ILLINOIS HOUSTON, TEXAS

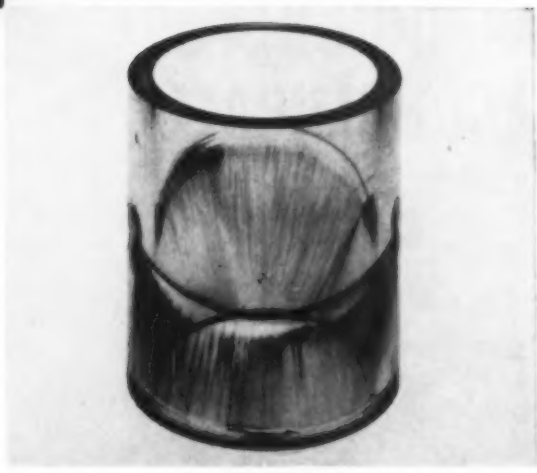
The **HACKNEY** Diamond is Your Assurance of ACCURACY and DEPENDABILITY

Write for Current Stock List

UNICOR®-LHS

Highest Detergent Activity in an Anti-Icing Agent

The three photos on the right were taken of glass throttle bodies at the conclusion of a carburetor cleanliness test in which the additives, at low anti-icing dosages, were compared on an equal cost basis.



No additive

Best competitive detergent additive

Unicor-LHS

Sure-fire prevention of carburetor icing—*plus* positive prevention of carburetor clogging! That's what you give your customers when you safeguard your gasoline by adding Unicor-LHS.

In addition to its well-known anti-icing and corrosion-protective characteristics, Unicor-LHS provides ideal detergency action. Recent tests at Universal's laboratories (see photos at right) demonstrate that Unicor-LHS imparts greater detergency to your fuel than the best competing additives.

Convenient and economical to use, this anti-icing additive can be introduced anywhere—refinery, bulk plant or filling station—at less than half the cost of ordinary anti-icers.

We shall be glad to determine the exact anti-icing and carburetor detergency requirements of your fuels.

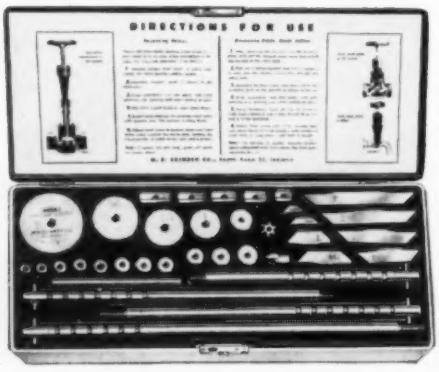
For detailed information, samples, or commercial quantities, write to our Products Department.

UNIVERSAL OIL PRODUCTS COMPANY

30 Algonquin Road, Des Plaines, Illinois, U.S.A.

More Than Forty Years Of Leadership In Petroleum Refining Technology

RESEATS VALVES and BIBBS QUICKLY ECONOMICALLY



Easily pays for itself on the first two jobs!

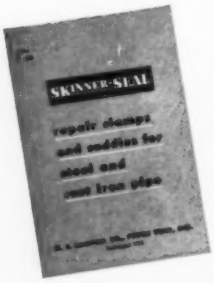
Reseats flat and tapered-seat globe or angle valves—all bibbs and faucets—in place, quickly and accurately. The saving, over tearing out and renewing leaky valves and fixtures, is tremendous.

Cutters operating under screw feed, leave worn, scored seats glass-smooth, level, absolutely accurate and tight.

A guide pilot centers each cutter; a tapered cone centers each spindle. Perfect alignment is inevitable. Cutters guaranteed. Write for literature!

2" for ¼" to 2" valves and ¼" to ¾" bibbs
List price $59.85

3" for ¼" to 3" valves and ¼" to ¾" bibbs
List price $79.50



FREE **catalog showing our pipe repair clamps, saddles, and reseating tools**

M. B. SKINNER CO.
SOUTH BEND 21, INDIANA

William A. Wood, Jr., Joins Carboline Co. Sales Department

William A. Wood, Jr., has joined the Carboline Co. Technical Sales Department in Houston. Wood has worked in the protective coatings design, sales and services for over 10 years. He was chairman of the NACE Houston Section in 1958.

Nicolet Industries, Inc., Names John H. Caldwell District Manager

John H. Caldwell has been appointed Southwest district sales manager for Nicolet Industries, Inc., in charge of pipe line felt sales. His territory will include Texas, New Mexico, Oklahoma, Kansas, Arkansas, Louisiana and Mississippi.

Albert & Harlow, Inc. Appoints Meagher Sales Representative

Joseph K. Meagher has been named sales representative for Albert & Harlow, Inc., Caterpillar Tractor dealers for Eastern Oklahoma. Meagher was associated with the Baroid Division National Lead Co. as sales representative before joining Albert & Harlow.

American Meter Co. Names Wetjen Vice President-General Manager

Russell W. Wetjen has been appointed vice president and general manager of American Meter Company's newly acquired subsidiary, Granberg Corporation. Wetjen also is vice president and general manager of the Buffalo Meter Company.

Before joining Buffalo in 1958 he had been sales manager of the Petroleum & Industrial Division of Neptune Meter Company.

Dean Hill Pump Company Changes Company Name

Dean Hill Pump Company, Inc., has changed its name to Dean Hill Corporation. The company was founded in 1890 as the Hill Machine Works in Anderson, Ind. Dean Hill Corporation produces centrifugal pumps and steam turbines.

Collins Radio Company Names H. J. Pyle Director of Service

Herbert J. Pyle has been appointed to the newly created position of director of service at the Cedar Rapids Division of Collins Radio Company.

Pyle, formerly vice president of Precision Instrument Laboratories in Glendale, Calif., will be responsible for directing the service program for all of Collins Cedar Rapids products.

Walworth Company Appoints Louk Sales Representative

Walworth Company has appointed Merrill D. Louk as a sales representative in the company's Los Angeles Division. His territory will include California, Nevada and Arizona. He has served as an engineer with Hancock Oil Co. and Lomita Gasoline Co.

Crane Carrier Industries Acquires Insley Manufacturing Maxi Division

Crane Carrier Industries, Inc., has acquired the Maxi Division of Insley Manufacturing Corp. The Maxi plant in Los Angeles is being dismantled and moved to Tulsa.

CATHODIC PROTECTION
Good-All
RECTIFIERS

NEW · NEW · NEW

Ask your Representative about the entirely NEW concept in Cathodic Protection! The Good-All

"AMP-O-MATIC"

Rectifier. Just set it and forget it . . . the Amp-O-Matic automatically ADJUSTS OUTPUT ITSELF!

GOOD-ALL ELECTRIC MFG. CO.
OGALLALA, NEBRASKA

90% *cut in operating and maintenance cost means*

CASH in the BANK for you!

New, Transistorized

M-SCOPE PIPE FINDER

only

$189.50

Rugged, transistorized construction practically eliminates maintenance costs . . . extends battery life to a year or more. Pinpoint accuracy, greatest depth penetration make the M-Scope first choice in the field!

New, Heavy Duty LEAK DETECTOR . . $295.00

Send for FREE 1960 Catalog.

FISHER
Research Laboratory, Inc.
Dept. PI-4, Palo Alto, California

What's New in EQUIPMENT

To receive more information on all new equipment articles use Readers' Service Card, last page of this issue.

Turbocharging Kits

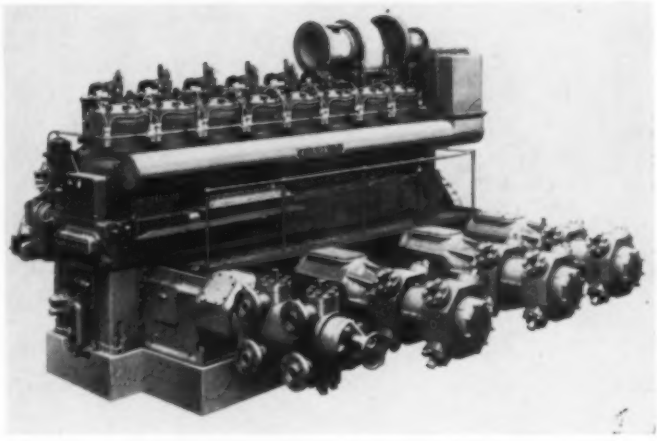
Turbocharging conversion kits, designed for the majority of models of the RA and HRA gas engine driven compressor lines, has been introduced by Clark Bros. Co. Horsepower increases range from 32 to 50 percent on the RA series and from 20 to 36 pecent on the HRA series, depending on design criteria.

Conversion packages provide a substantial reduction in fuel consumption per bhp and permit increased horsepower output, usually without the need for additional cooling service. Packages contain scavenging air intercooler, dry exhaust manifold, control mechanisms and all parts for turbocharged engine.

Every conversion is handled as a separately engineered package tailored to the specific unit.

(This item supplements Clark Bros. Co. data on pages 98-92 of the Pipe Line Catalog, Second Revision.)

For more data, circle **No. E1** on Readers' Service Card, last page this issue.



Rotary Compressor

Le Roi Division announces several improvements on its portable rotary compressor model 125RG2. Three safety features added are a cut-off switch that automatically shuts down compressor if engine oil pressure drops too low; an automatic dump valve that instantly releases air pressure in receiver when compressor is shut down. This eliminates oil backing up into the air-end; and a non-wearing orifice, located in receiver outlet, assures proper air-end oil cooling by holding 40 pounds pressure in the receiver.

For more data, circle **No. E2** on Readers' Service Card, last page this issue.

Communications System

Featuring a lightweight and completely portable unit, Seiscor Division of Seismograph Service Corp. announces new two-way personal radio communications system. It has a limited range system for person-to-person communications with a completely transistorized transmitter-receiver unit weighing less than one pound, including batteries.

Units are available in five standard models. One model includes radio unit and batteries, noise-cancelling earphones and built-in antenna as integral parts of a plastic safety helmet, with attached noise-cancelling hand microphone.

For more data, circle **No. E3** on Readers' Service Card, last page this issue.

Filter Cleaner

An ultrasonic cleaner has been developed to restore used filter elements to their original differential pressure and dirt-holding capacities. The HyperIntense Proximal Scanning unit, HIPS, developed by Pall Corporation and Cavitron Equipment Corporation, produces maximum ultrasonic cleaning intensity in a liquid. Filter element is rotated through a hyperintense proximal field until surface of the element is cleaned.

Particles are flushed away as they are loosened. Most filter elements can be cleaned in 10 minutes.

For more data, circle **No. E4** on Readers' Service Card, last page this issue.

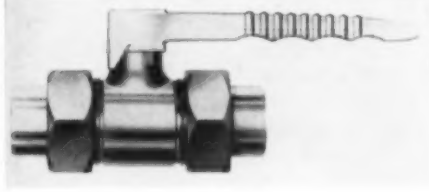
Increased Horsepower

International Harvester Company announces increased horsepower ratings for its UD-14A and UD-691 engines.

The 14A has a pressurized cooling system and jet-type cylinder head. Intermittent rating has been boosted from 79 to 101 hp at 1,650 rpm, while continuous rating has been raised from 67 to 82.5 hp at 1,650 rpm.

Featuring a pressurized cooling system and increased coolant capacity, the 691 unit's intermittent rating is upped from 131.5 to 141.5 hp at 1,600 rpm. Continuous rating has risen from 107 to 120 hp at 1,600 rpm.

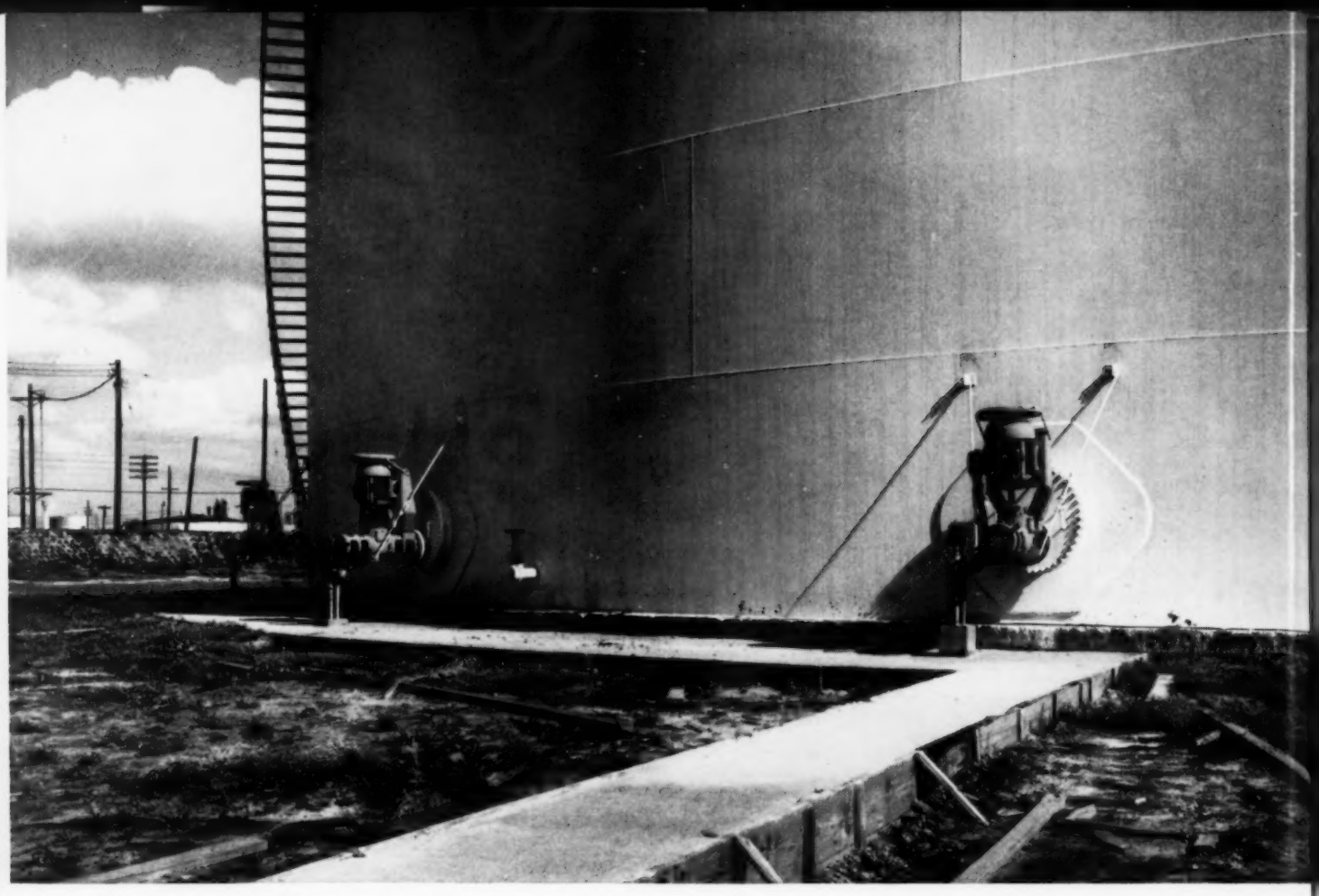
For more data, circle **No. E5** on Readers' Service Card, last page this issue.



Ball Valves

A new ball valve is the latest addition to Cooper Alloy Corporation line of valves. Handle is made of metal with low thermal conductivity which insulates operators' hands from high-low temperatures. The adjustable stuffing box can be repaired under pressure, the positive slotted-drive keyway in ball eliminates ball wear, leakage is eliminated by stuffing box with ring packing and every stem is built for heavy duty service. Full port opening permits straight through flow with no restrictions.

For more data, circle **No. E6** on Readers' Service Card, last page this issue.



How they keep crude from **stacking up like pancakes**

Surging into this tank come crudes from wells scattered over 23 counties.

Out of the tank comes *one* crude, at the right gravity to feed to refineries more than 450 miles away.

For the men who run the tank farm, it's no chore at all to blend 122,000 barrels of crudes ranging from less than 20° to above 85° in gravity. They do it by flipping three switches.

The LIGHTNIN Mixers you see here do the rest. While the tank is filling, and for two or three hours before it goes on suction, the mixers create a powerful, steady turnover that breaks up stratification from the bottom up. The outgoing tender of crude stays within a degree or two of constant gravity.

Control BS&W, too. That's not all. These mixers help keep sludge from settling on the tank bottom and stealing valuable storage space. They keep the tank working at its full capacity.

Multiply these savings by the number of tanks at this farm equipped with LIGHTNIN Mixers—and you can see why more than 50 pipeline companies and 35 leading oil companies use this easy way to keep operating costs in line.

How about you? If you'd like to see how LIGHTNIN Mixers on your big tanks can save you as much as $1000 per tank per year, call in your LIGHTNIN representative. He's listed in Composite Catalog. Or write us today.

YOU CAN ADD as much as 12% extra storage capacity to your tank farm—by using LIGHTNIN Mixers to keep tanks free of space-eating sludge. Mixing results are unconditionally guaranteed.

Lightnin® Mixers

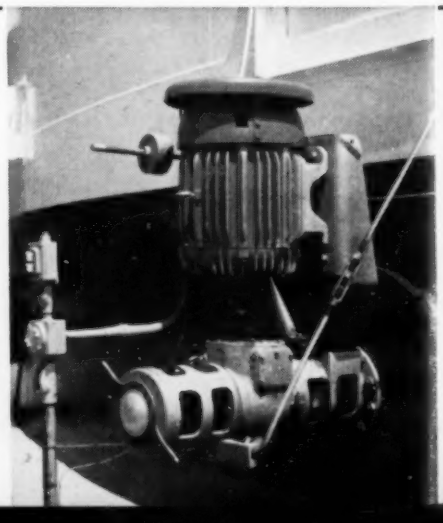
MIXCO fluid mixing specialists

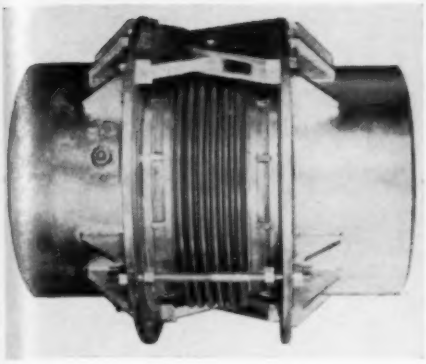
Get these helpful bulletins on BS&W control and LIGHTNIN Mixers. Check, tear out and mail to us today with your name and company address. Free—no obligation.

- ☐ BS&W Control with LIGHTNIN Mixers (B-503)
- ☐ Side-entering mixers, 1 to 25 hp (B-104)
- ☐ Data sheet for figuring mixer requirements (B-107)
- ☐ Condensed catalog describing LIGHTNIN Mixers—all types (B-109)
- ☐ LIGHTNIN rotary mechanical seals to eliminate stuffing-box maintenance (B-111)

MIXING EQUIPMENT Co., Inc., 196-b Mt. Read Blvd., Rochester 3, N.Y.

In Canada: Greey Mixing Equipment, Ltd., 100 Miranda Ave., Toronto 19, Ont.



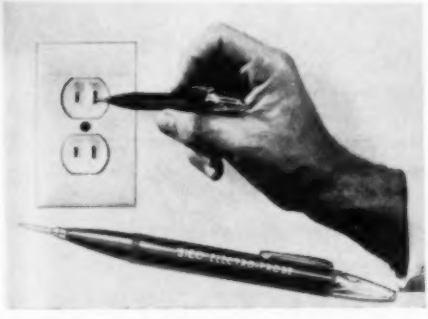


Expansion Joint

A new hinged type expansion joint for piping systems which is not supported or anchored is announced by Zallea Brothers. The joints permit system to be entirely self-supporting, eliminating need for additional supports and reducing bending stresses.

Standard model of expansion joint is designed to take rotation in one plane only; the joints are used in combinations of two and three. Three basic units are available to meet requirements of movement, pressure and temperature conditions.

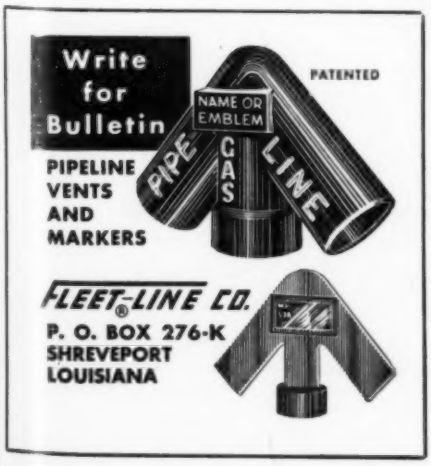
For more data, circle **No. E7** on Readers' Service Card, last page this issue.



Current Tester

An electric tester, all-purpose, one-hand operated tester for any current, has been announced by The Hahn Company. If outlet, switch, etc. is live, tester lights up. Also indicates which side of outlet is live, which is grounded and tests from 110 volts to 550 volts, AC or DC. Cost $1.

For more data, circle **No. E8** on Readers' Service Card, last page this issue.



Joe Roughneck's solid source of supply...

API CASING | API TUBING | API LINE PIPE

Wheel of plenty! Welding pipe by electric resistance weld process. Lone Star API pipe is fully normalized.

Joe Roughneck, of course, is symbolic of the men who have made the fabulous oil and gas industry tick . . and Lone Star Steel's huge completely integrated plant is right in the middle of Joe's workshop. Lone Star pipe is quality-controlled from mining of ore to finished pipe. In addition to operating day and night to supply Joe's pipe needs . . Lone Star has recently completed new and even larger facilities.

Neighbor, wherever you are, specify Lone Star and we both get a good deal!

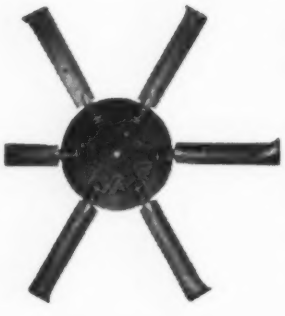
©1956 Lone Star Steel Company

Lone Star STEEL COMPANY

EXECUTIVE—SALES OFFICES
W. Mockingbird Lane at Roper • P. O. Box 12226 • Dallas, Texas
DISTRICT SALES OFFICES
912 Republic National Bank Building, Dallas, Texas
Houston, Texas | Midland, Texas | Tulsa, Oklahoma

"HIGH and mighty"

move mountains - of AIR!
in towers and exchangers



- Sizes 14' to 18'
- 4 or 6 blades

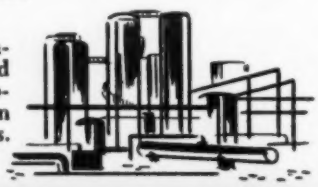
Developed originally for the petroleum industry, Aerovent Large-Diameter "Al-metal" Propellers, constructed of tough, durable aluminum alloy, move great quantities of air at high velocities, in heat exchangers and cooling towers. Pictured above are two 4-blade, 16-ft. propellers in a cooling tower installation. These mighty propellers, with adjustable-pitch "Macheta" Airfoil blades, are job-engineered to individual specifications.

Write for free Bulletin 510

DESIGNED FOR DEPENDABLE OPERATION!

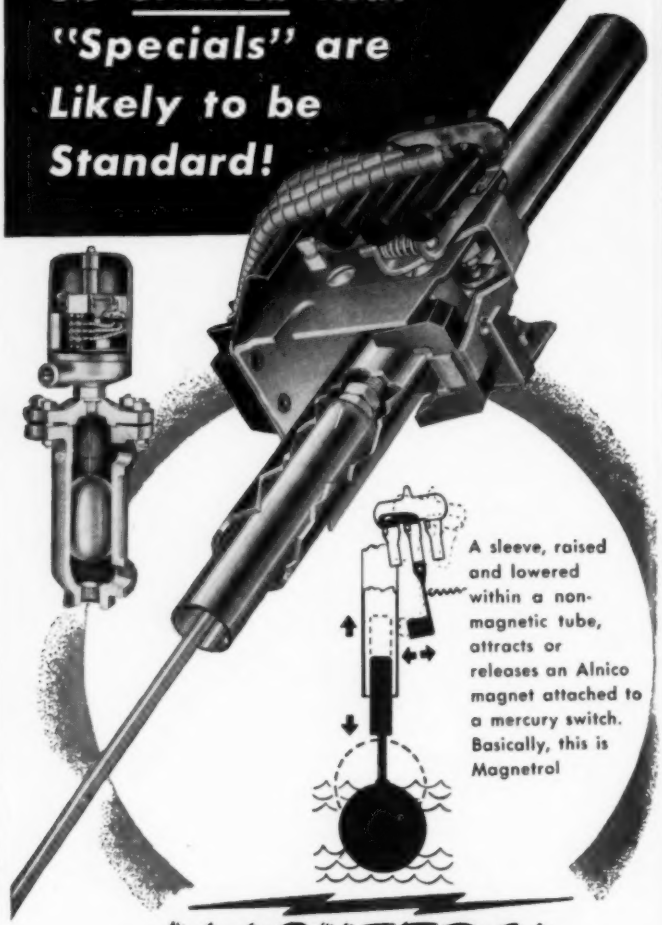
Endurance tests, conducted at *3 times* normal loading prove the ability of these new large-diameter propellers to withstand severe punishment. Heavy-duty cast steel hubs offer maximum resistance to stresses. Angle settings for each operating requirement, and appropriate alternate settings, assure accurate pitch for any predetermined performance which may be required. 54" to 144" now available in Adjustable Pitch Models.

REFINERIES, pumping stations, industrial plants and commercial buildings use Aerovent "Al-metal" Propellers in major air-moving applications.



Aerovent FAN COMPANY, INC.
LARGE PROPELLER DIVISION
304 Wright Bldg.
TULSA 3, OKLA.
Main Office and Factory
PIQUA, OHIO

So SIMPLE that "Specials" are Likely to be Standard!


A sleeve, raised and lowered within a non-magnetic tube, attracts or releases an Alnico magnet attached to a mercury switch. Basically, this is Magnetrol

MAGNETROL

The World's Most Dependable

LIQUID LEVEL CONTROL

Because of the utter simplicity of Magnetrol's magnetic operating principle, standard models can be easily adapted to meet any special requirements for pressure, temperature or corrosive liquids . . . and usually at little extra cost. This Magnetrol versatility has solved all kinds of tough level control problems . . . and given our engineers wide application experience that can be invaluable to you.

Magnetrol is so simple that failure is all but impossible! Using only permanent, unfailing magnetic force for its operation, there's nothing to wear out . . . no diaphragms or bellows to stiffen and rupture . . . no electrodes to short or corrode . . . no packing to bind or leak. Magnetrol is practically maintenance-free! Magnetrol units are available for controlling level changes from .0025-in. to 150-ft. . . . with multi-stage switching when desired. Send coupon for full details.

MAGNETROL, Inc.

Send Coupon For Full Details

MAGNETROL, Inc., 2128 S. Marshall Blvd., Chicago 23, Illinois

Please send me catalog data and full information on Magnetrol Liquid Level Controls. 6

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

Pressure Switch

Bristol Company has introduced a new sub-miniature, adjustable pressure switch for performance up to 200 psi under vibrations, shock and acceleration test conditions. A Ni-Span C pressure capsule and snap-action switch are housed in the stainless steel container. Volume of the unit is less than 1 cubic inch; weight is slightly over one ounce. Pressure setting adjustment is simple and setting is positive, even under severe shock and vibration conditions.

For more data, circle **No. E9** on Readers' Service Card, last page this issue.

Hydraulic Rams

Owatonna Tool Co. has introduced a new line of single-cylinder, single-acting hydraulic rams. Rams are compact, lightweight and allow easy application of OTC hydraulic power to many operations.

Nine sizes are available from 1-11/16-inch long with ⅝-inch stroke, to 20¼-inch long ram with 13½-inch stroke. Capacities range from two to 50 tons with maximum working pressures of 8,650 and 10,000 psi.

For more data, circle **No. E10** on Readers' Service Card, last page this issue.

Flange Spreader

For use on ASA ring joint flanges, a heavy duty model of the safety boy flange spreader has been introduced by Wm. L. Riggs Company. This model 104 will handle flanges of 150 pounds through 1,500 pounds in pipe range from 8 through 24-inch.

This item supplements Wm. L. Riggs Company data on page 373 of the Pipe Line Catalog, Second Revision.)

For more data, circle **No. E11** on Readers' Service Card, last page this issue.

THE THINGS YOU NEED TO KNOW

About

LATEX

- PIPE LINES
- COMPRESSOR STATIONS
- OIL AND PRODUCTS PUMPING STATIONS
- MARINE TERMINALS
- PIPE LINE TERMINALS
- GAS DISTRIBUTION SYSTEMS
- PEAK SHAVING PLANTS

LATEX

LATEX CONSTRUCTION CO.

P. O. BOX 12128

ATLANTA 5, GEORGIA

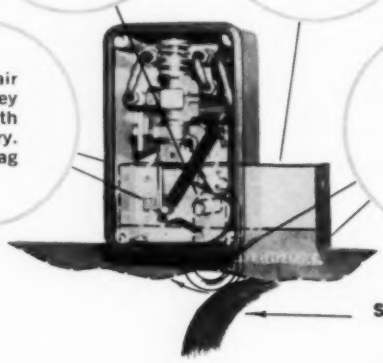
Here is Maloney's new "SPHERE-HERE"

Sphere/Scraper Indicator for Pipe Lines

Large diameter shaft, extending on both sides is designed to provide plenty of driving torque for accessory use. Oversize bushings and ample packing provide positive pressure sealing to maximum limits.

The entire basic "Sphere-Here" body is milled from a single block of steel. Design pressure is 1440 psi, WOG. Bolted to the base plate, the unit requires no welding on the working unit, eliminating warp and heat damage problems during installation.

Illustrated with a three-way pilot air valve and counter . . . the Maloney **"Sphere-Here"** is available with practically any desired accessory. Basic model is manual reset, flag indicator.



Tripping arm, projecting into the pipe, is equipped with a large diameter wheel to prevent damage to Spheres or Scraper rubber. Heavy base plate is ready scarfed to weld to pipe. Installation is simple, and the unit can be installed in any position on the pipe.

Maloney's new "SPHERE-HERE" Sphere/Scraper indicator for Pipe Lines. Rated at 1440 psi, the **Sphere-Here** is designed for trouble free use on any Pipe Line. Standard units available with visual indicators and electrical switches. Variations from standard available. Field proven in liquid and gas line service on two continents.

F. H. Maloney COMPANY

2301 TEXAS AVENUE
P. O. BOX 1777
HOUSTON 1, TEXAS

OFFICES IN
CHICAGO • LOS ANGELES
PITTSBURGH • TULSA

"PRECISION IN RUBBER • METALS • PLASTICS"

The Goodman Cylindrical Stopper

FOR GAS, OIL, WATER AND DRAIN PIPES

The Goodman Cylindrical Stopper is an inflatable bag with a rugged water-proofed casing which may be inflated to a high internal pressure and will hold against as much as ten pounds pressure in the pipe.

The broad central zone makes contact with the wall of the pipe and holds against a higher pressure than other types of bag.

This Stopper has been used successfully for testing soil pipes in new buildings and for stopping oil pipes around refineries. Water-works engineers use it to save pumping while altering or repairing mains where leaky valves are encountered. It is now giving satisfaction in sewer work, and in at least one instance it saved a city water-works a large expenditure of money.

Safety Gas Main Stopper Co., Inc.

523 ATLANTIC AVENUE

BROOKLYN 17, N. Y.

PETROLEUM ELECTRONICS ENGINEER

For a top man with intimate knowledge of electronics as applied to the petroleum, oil and gas pipeline industry, ASCOP offers an outstanding position with an excellent future.

The position calls for applications engineering, influence of new designs, and heavy technical sales back up for ASCOP's already established, successful, supervisory control, alarm annunciator and telemetering equipment. Considerable scope and responsibility will be given to the man who fills this position.

If you have the background in pipeline electronics and communications, please contact Mr. M. T. Jacobs to arrange a personal interview.

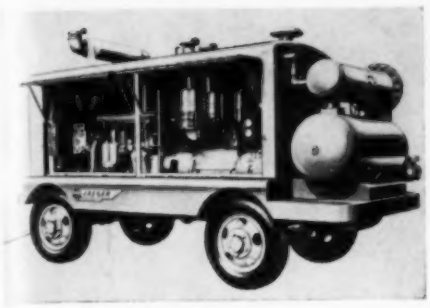
ASCOP

A DIVISION OF ELECTRO-MECHANICAL RESEARCH, INC.

P. O. BOX 44 — PRINCETON, N. J.

PHONE Swinburne 9-1000

A SCHLUMBERGER COMPANY



Air Compressor

Jaeger Machine Company has developed a rotary air compressor which delivers 900 cfm of air at an operating speed of only 1,700 rpm. It is powered by a Model 6-110 G.M. diesel engine. Close automatic regulations of engine and compressor maintain 100 psi minimum air pressure under all normal demand. Engine speed modulation is smooth and stepless and positively prevents any over-run or racing. Stopping and starting require only the half-turn of a regulator crank.

For more data, circle **No. E12** on Readers' Service Card, last page this issue.

Swiveling Headache Ball

Miller Swivel Products, Inc., announces a new 600-pound swiveling headache ball for whip lines on crane booms 200 feet and over. The unit provides fast, safe overhaul with maximum efficiency. Precision ball-bearing swivel is designed to eliminate twisting and kinking of wire. The Model HB16 is available in standard four types for easy rigging: clevis, eye, wedge and thimble.

For more data, circle **No. E13** on Readers' Service Card, last page this issue.

These two styles of Allpax Packing cover a wide range of applications and many different uses, consistent with the policy of our company—fewer packings for more services.

Both are compounded of the highest quality materials, and between them they cover against such service conditions as steam, water, air, ammonia, gases, oils, distillates, dowtherm, etc. They are for use on centrifugal and rotary pumps, valve stems, expansion joints and similar equipment.

Packaged in durable metal containers to insure protection and preservation of material. Applications and uses conveniently noted on each container.

Style No. 1 is really universal in its uses—where the temperature does not exceed 600 degrees F.

Style No. 2 also has an extremely wide variety of uses in higher temperatures, ranging from 600 degrees F. to 1200 degrees F. This is because of a special bonding compound, containing a heat-proof lubricant, which maintains the lubricant under high temperature conditions.

Both types are made in ring, spool or coil form in a wide variety of sizes. Allpax Packings do a better job for manufacturers and replacement use because they are precision-made, accurate in dimensions. They provide a tight seal without danger of scoring or unnecessary wear.

ALLPAX

"The Packing that Packs All"

SEND FOR OUR NEW CATALOG — TODAY!

A complete line of packing, tools, gasket materials.
Distributors in principal cities.

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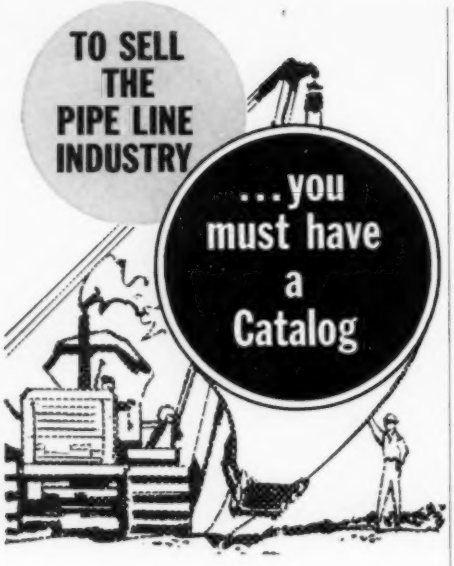


To Provide...

needed data from which your customers can buy your products or services.

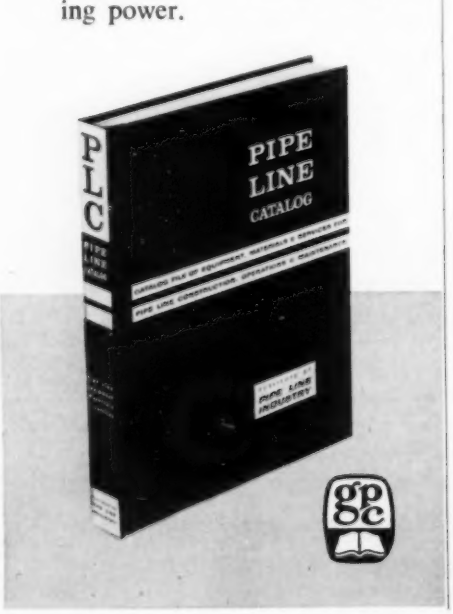
To Reach...

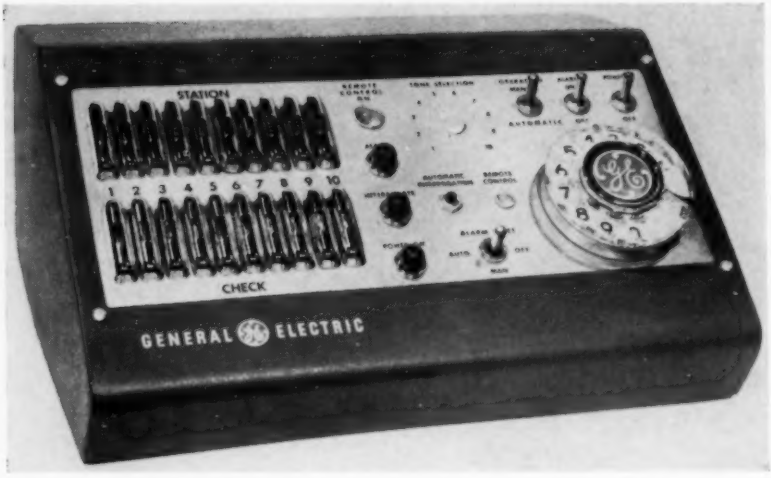
the widely scattered, mobile market that makes personal selling difficult.

To Cover...

all men of buying authority *when* they are ready to purchase — whether your salesman is at hand or not.

All three of these functions are handled most effectively through use of the PIPE LINE CATALOG . . . preferred by 91% of the industry's buying power.





Alarm Control System

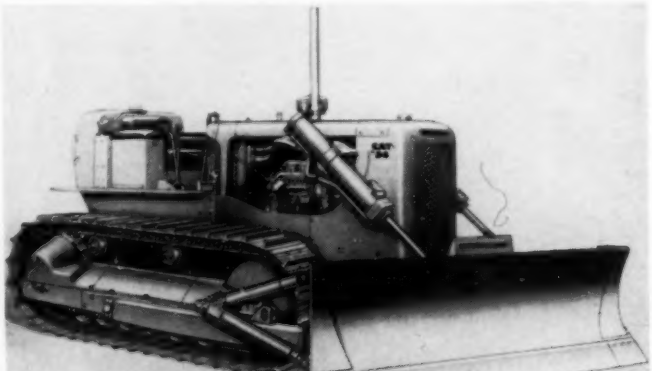
A new alarm/control system has been introduced for pipe line and similar companies which monitor and control unattended locations remotely.

General Electric's system may be used with microwave, carrier current or wire lines. As many as 100 different points may be checked remotely. Signals will indicate whether a pre-scheduled course is taking place or whether faults have occurred.

At the control terminal, a console has a bank of 10 indicator lamps to show stations being selected and a second bank to show any faults. A dial is used to select and check station and operate remotely-controlled equipment at unattended distant points.

(This item supplements General Electric Company data on pages 199-202 of the Pipe Line Catalog, Second Revision.)

For more data, circle **No. E14** on Readers' Service Card, last page this issue.



New Tractor Series

Caterpillar Tractor Company announces a new model D4 tractor, the Series C, and also a redesigned model D6 Series B tractor.

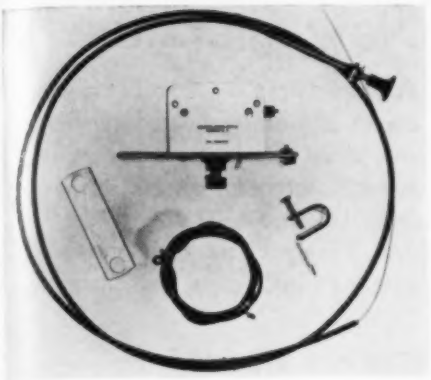
New features which mark the D6 unit are a new engine providing 25 percent greater lugging ability; two hydraulic control units integrally mounted; tilt cylinder for special applications; optional transmission for higher drawbar pounds pull and a more comfortable and efficient operator's compartment.

On the D4 model, the tractor is rated at 52 drawbar horsepower with increased lugging ability at 25 percent. It has forward-reverse lever for shifting with five speeds forward and four in reverse. It features a new dry type air cleaner with two filter elements and a precleaner.

Both models are available in gasoline and diesel engines with optional direct electric starting systems. The units have increased fuel tank capacities and offer improved visibility for operators.

(This item supplements Caterpillar Tractor Co. data on pages 76-79 of the Pipe Line Catalog, Second Revision.)

For more data, circle **No. E15** on Readers' Service Card, last page this issue.



Master Safety Switch

A master safety switch designed to eliminate risk of electrical fire in parked vehicles, lengthen battery life and reduce maintenance has been announced by Sampson Safety Products Company.

The switch works on the principle of eliminating battery drain which accelerates battery deterioration. It is designed to cut the battery free from wiring system and ground out the ignition system. Even with a straight-wired ignition, equipment cannot be started while the switch is actuated. A control in the cab mechanically and remotely actuates the switch. It is built of ⅛-inch cold rolled steel throughout; cadmium plated to withstand corrosion.

For more data, circle **No. E16** on Readers' Service Card, last page this issue.

Solenoid Valve

Magnatrol Valve Corporation has introduced a new type "L," full port normally closed solenoid operated valve for use on systems up to 500 psi with temperatures up to 400° F.

The valve can be cleaned and operating mechanism replaced without removal of valve body from the line. By decoupling the hermetically sealed solenoid cup and lifting out the entire operating component maintenance, inspection and cleaning is quickly performed.

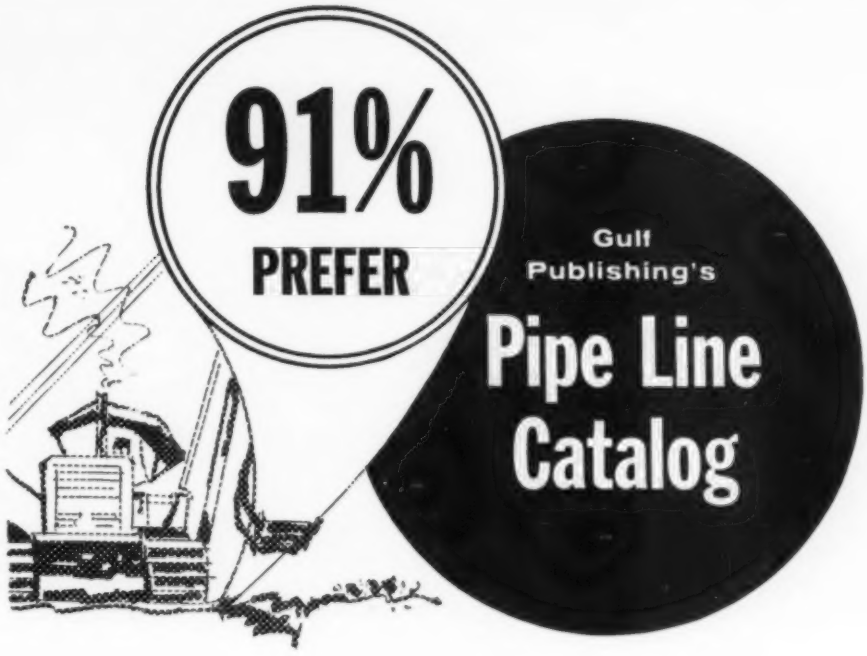
For more data, circle **No. E17** on Readers' Service Card, last page this issue.

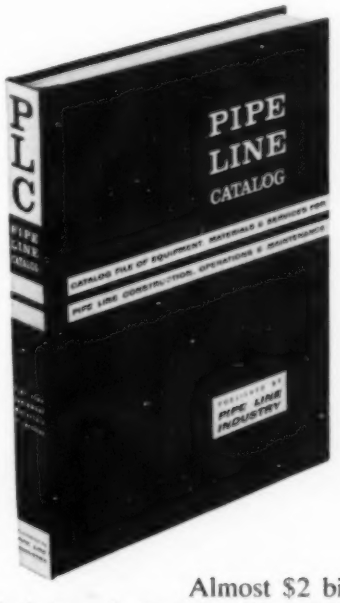
Electronic Multiplier

A new am/fm electronic multiplier, designed to provide four quadrant multiplication of input variables, has been announced by Computer Systems, Inc. High frequency accuracy, reporter ±0.05 percent of full scale at 500 cps, permits its use in generating functions of two variables and in high speed repetitive operation.

The MC-701 uses one variable (X input) to control the frequency deviation about some reference carrier frequency (1.5 megacycles), while the other variable (Y input) controls amplitude of the carrier. The unit is available as a single component or housed in groups of eight masters and 16 slaves.

For more data, circle **No. E18** on Readers' Service Card, last page this issue.





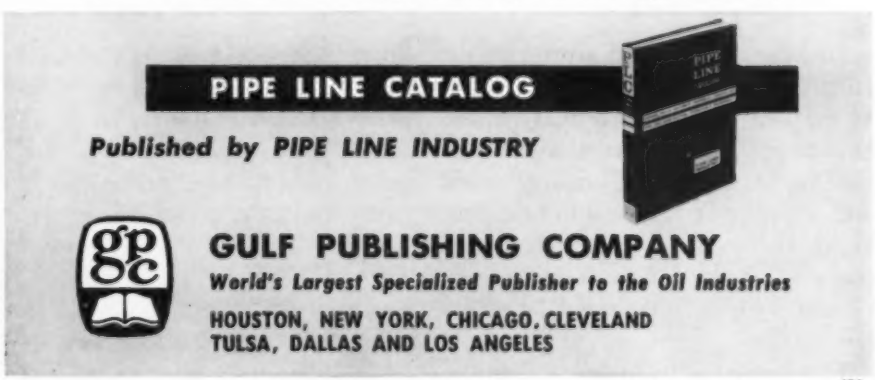
A strong 91.4% of industry men responding to catalog usage surveys indicate they prefer to have catalog data furnished to them in the PIPE LINE CATALOG.

More than 5,500 key men in Pipe Line and Pipe Line Contracting Companies will receive the 1960-61 PIPE LINE CATALOG. The names and addresses of these men of established buying power have been supplied by the companies themselves, assuring the cataloger of unduplicated, waste-free distribution.

Almost $2 billion will be spent by the pipe line industry during the life of the 1960-61 PIPE LINE CATALOG. Make sure your product data are on hand when the buying decisions are made.

There's still time – closing date for the 1960-61 edition is April 1. Call your local Gulf office or write for complete Fact Book.

Greater Petroleum Coverage Through Market Specialization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World's Largest Specialized Publisher to the Oil Industries
HOUSTON, NEW YORK, CHICAGO, CLEVELAND
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172

Only a Jaeger can deliver 600 cfm of air at 1700 rpm

Using the same Model 6-71 GM diesel engine, a Jaeger "600" rotary delivers the same air volume at 1700 rpm that other compressors must speed up to 1800 rpm to produce. You save fuel and wear, with as many as 48,000 *fewer* compressor revolutions, every day you work. • Jaeger 125, 250 and 365 cfm rotaries have this same high efficiency characteristic. Ask your Jaeger distributor to demonstrate — or send for Catalog JCR5.

The Jaeger Machine Company, 665 Dublin Ave., Columbus 16, Ohio

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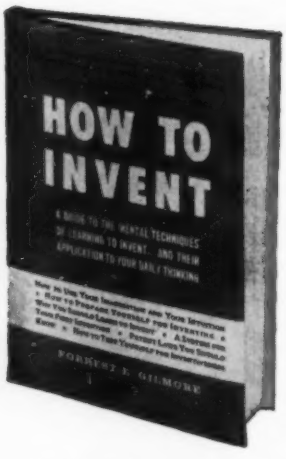
Just Because You Have Never Invented Anything Does Not Mean You Have No Talent For It.



HOW TO INVENT

By Forrest E. Gilmore

Price $2.50

A guide to the mental techniques of learning to invent . . . and their application to your daily thinking.

In easy-to-read and understand language this book shows you: how to use your intuition and imagination, how to prepare for invention, how to test your Ingenuity Quotient, when and where to invent, how to find time to invent, ways to profit from your invention, how to record your observations, why some potential inventors fail.

The book also contains a detailed discussion of patent practices you should know such as: how to decide what is patentable, how to go about obtaining a patent, what a patent really means, how to protect your patent from the beginning.

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New Literature

For more data on New Equipment or copies of Catalogs and Literature reviewed in this issue, use the Reader Service postcards just inside the back cover and facing the Advertisers' Index. Simply circle code numbers of items desired—sign and mail card.

Correct Electrode?

A new film titled "Arc Welding Electrode Selection" has been produced by Hobart Brothers Co. The 25-minute 16-mm, color movie tells the story of basic factors which are important for correct electrode selection.

It outlines procedure that cover base metal identification, welding currents, welding positions, thickness and shape of base metal to be welded, joint design and fit-up, service conditions, and job conditions, all important in selecting electrodes. Reservations for a showing of the new film may be made with the film library, Hobart Brothers Co., Troy, Ohio.

To get a copy, circle **No. E19** on Readers' Service Card, last page this issue.

Packaged Compressor

Cooper-Bessemer Corporation announces availability of a 6-page bulletin on the DM-125 packaged compressor 300 horsepower class. Power unit and compressor cylinders used in package are discussed along with operating characteristics. These units are skidded, prepiped and given a closed water system by C-B Southern, Inc.

To get a copy, circle **No. E20** on Readers' Service Card, last page this issue.

Pulse Code

The Vapor Recovery Systems Company announces a new pulse code telemetering system bulletin. Complete with schematic drawings, the bulletin describes and illustrates several types of applications of the system for the remote indication of liquid level, temperature, PD meters, pressure gages, and control device indicators.

The easy to understand booklet features such items as security, transmission and pulse rate, ease of maintenance and many others.

To get a copy, circle **No. E21** on Readers' Service Card, last page this issue.

Motor Reducers

Philadelphia Gear Works has issued a 28-page catalog on vertical motoreducers and in-line reducers. This deals with motor reducers for use with equipment such as blowers, compressors, conveyors, cranes, hoists and machine tools.

It describes construction and mechanical features of reducers in eight housing sizes for applications up to 125 hp and output speeds of 9 rpm to 420 rmp. Also covered are complete mounting dimensions and parts lists for each type of reducer listed.

To get a copy, circle **No. E22** on Readers' Service Card, last page this issue.

LIGHTWALL . . . biggest value for your pipeline dollar

Southwestern LIGHTWALL Electric Resistance-Weld Line Pipe greatly reduces weight without sacrificing performance . . . delivers actual dollar savings four ways over standard-weight pipe. With Southwestern LIGHTWALL, every customer benefits from savings in initial cost, transportation, installation, and in longer life when given proper corrosion protection. Southwestern LIGHTWALL Electric Resistance-Weld Line Pipe is available in a wide range of wall thicknesses to .188" wall, from 1.315" O.D. to 4.500" O.D. Because of Southwestern's manufacturing flexibility and large inventories of selected steel coils, you can depend on prompt deliveries.

LICENSED BY THE AMERICAN PETROLEUM INSTITUTE

SOUTHWESTERN PIPE, INC.*

**Corporate name changed from Southern Sales & Transportation Co. May 1st, 1959*

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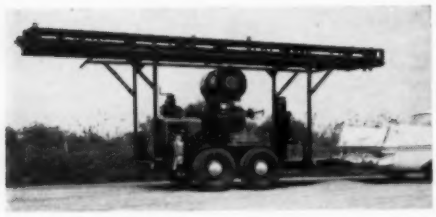
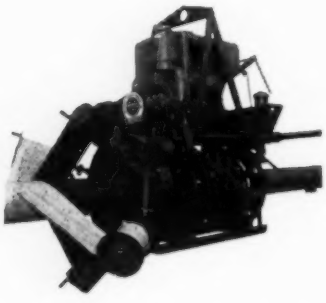
MYOCO...

For More Dependable Equipment and Service

HERE ARE MACHINES THAT BRING ADDED EFFICIENCY TO YOUR TAPING AND CLEANING AND TAPING.



The Myoco fully portable type stationary, semi-automatic, cleaning, priming and tape wrapping machine, is quickly and easily moved from one jobsite to another by passenger automobile or pick-up. Powered with air-cooled Wisconsin motors. Sizes 2" thru 6" inclusive.



MYOCO Model OW Power Driven Cleaning and Taping machine combines two operations for increased speed of operations with less equipment. Line travel machines are available to handle pipe sizes 3" to 6", 6" to 12", and 14" to 20". A Wisconsin Model Vg4D V-type 4-cylinder heavy-duty air cooled engine, combined with the design and engineering features of this machine, guarantees uninterrupted service.

When you use MYOCO pipeline equipment, you quickly find that servicemen are experienced and available twenty-four hours a day, with fast transportation available to serve you in any way; efficient equipment operation is assured by periodical checks; and if possible, parts and supplies are shipped the same day ordered.

MORRIS-YOUNG-OWENS CO. PIPELINE EQUIPMENT AND SUPPLIES MYOCO

MORRIS-YOUNG-OWENS CO.

PIPELINE EQUIPMENT AND SUPPLIES

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PArkview 3-0110
In Canada: MYOCO LTD., 30 Bloor St. West
Toronto 5, Ontario, Canada, Tel. WA 2-9444

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Editorial Index Now Available

The Editorial Index is now at the printers and soon will be ready for distribution. The 1959 Editorial Index provides a time-saving entry into all 12 issues of PIPE LINE INDUSTRY published in 1959.

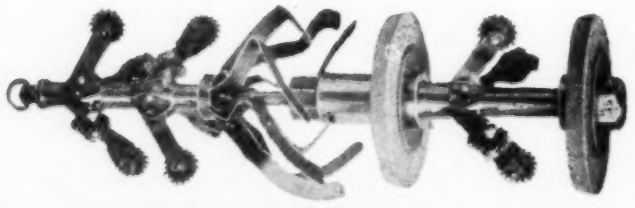
Bound in a handy pamphlet form, the Editorial Index lists each and every article and its author. To get a copy, write the Librarian, Gulf Publishing Company, P. O. Box 2608, Houston 1, Texas. Or, if you prefer, check the square provided on the blue Reader's Service Card at the back of this and every issue of PIPE LINE INDUSTRY.

Be assured of getting your copy by ordering your Editorial Index now. The supply is limited.

Go-Devil

NORTHRUP GO-DEVILS

Heavy Duty Model with Neoprene cup or disc drivers



G. A. COTTEN CO.

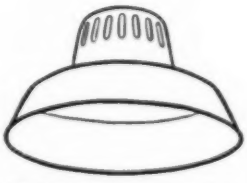
NORTHRUP GO-DEVILS & *Manufacturers of* TRANSIT PIPE LINE SCRAPERS

P. O. Box 5332
Tulsa, Okla.

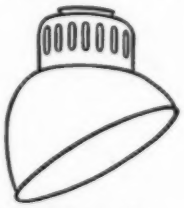
Now you can get optional

SLOTTED Reflectors

on these Crouse/Hinds Lighting Fixtures



Explosion-proof—Type EV, Dust-ignition-proof—Type DL in slotted dome or angle reflectors.



Vapor-tight, weather resistant types V and VM in slotted dome or angle reflectors.

Reduce fatigue, accidents and worker tension; improve working environments and employee relations. In both original and replacement installations in major plants, the new slotted reflectors—exclusive with Crouse-Hinds—produce the following results:

- Elimination of dark, dungeon-like areas above reflectors
- Elimination of harsh brightness contrast, improving visibility and seeing comfort
- Reduction of fatigue of workers, and accidents due to fatigue
- Increase of production in machine work, assembly and inspection operations
- Reduce fixture operating temperature and worker discomfort from reflected heat, especially with low-hanging fixtures
- Reduced accumulation of dirt and dust, due to improved air circulation through reflectors
- Slotted reflectors are white enamel finish inside and out

FOR COMPLETE INFORMATION on all Crouse-Hinds lighting fixtures equipped with the new slotted reflectors, call your nearest Crouse-Hinds distributor, or write us.

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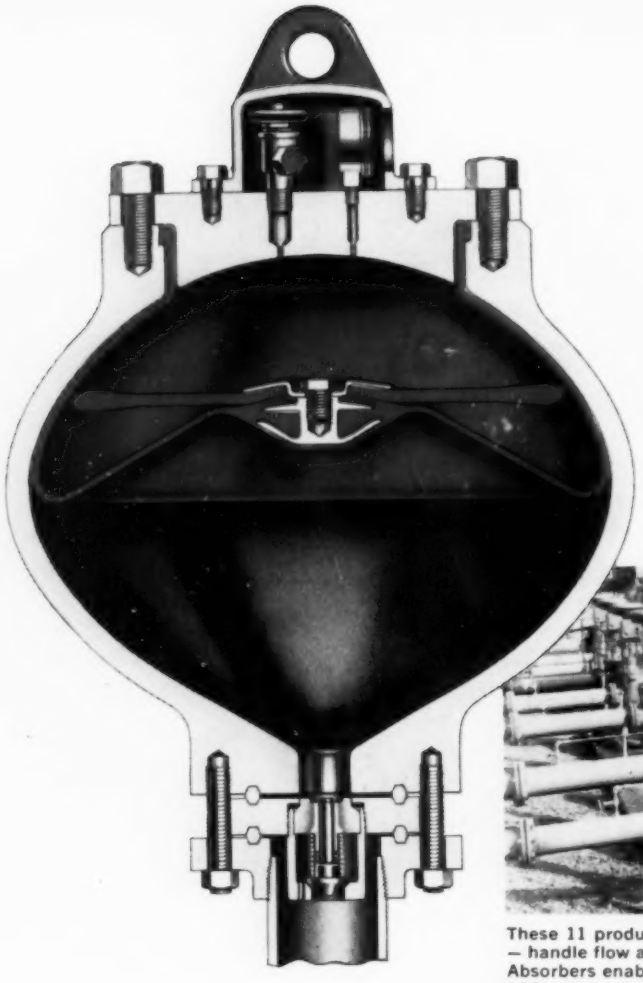
CROUSE-HINDS COMPANY OF CANADA, LTD., TORONTO, ONT. CROUSE-HINDS INSTRUMENT COMPANY, INC., SILVER SPRING, MARYLAND

prolongs life of pipelines, fittings and pumps... saves downtime... cuts maintenance costs!



These 11 product transfer lines — some over 1,000 feet long — handle flow at the rate of 1,600 gpm each, yet Hydril Surge Absorbers enable them to be closed in a fraction of a second without over-pressuring lines, fittings or metering equipment.

HYDRIL TYPE "K" SURGE ABSORBER

smooths out shock and pulsation in pipelines

QUICK-CLOSING VALVES and piston-type pumps punish pipelines by imposing sudden peak pressure loads. Unless these surges can be absorbed or smoothed out, pipe and fittings are exposed to stresses which may cause costly failure.

Hydril Type "K" Surge Absorbers are successfully controlling many types of line surge and pulsation in petroleum product handling lines, water pumping systems and oilwell repressuring programs. Simple design and construction assures long, trouble-free operation. This same oil field-proven Hydril design has been used for many years as a pulsation dampener on high-pressure oilwell mud pumps. Servicing, though rarely required, is readily performed without special tools and without shutting down the system or removing the unit from the line. Available in a wide range of sizes and pressure ratings.

Another dependable Hydril pressure-control product

For more detailed information on Hydril Surge Absorbers, consult your Pipeline or Composite Catalog... or call your Hydril Representative

HYDRIL COMPANY

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Factories: Los Angeles, Calif.; Houston, Texas

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